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FACTORY PRODUCTIVITY AND EFFICIENCY

IV. OVERHEAD LABOUR PRODUCTIVITY—AND SOME CONCLUDING COMMENTS

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This is the final article in the series describing the results of a comparative study of productivity and efficiency in three factories in the fractional horse-power electric motor industry. Previous articles published in the Bulletin *were:*

- *I. Problems of Measurement, August* 1960.
- *II. Design and Material Usage, February,* 1961.
- *III. Direct Labour Productivity, August* 1961.

We shall refer to these articles as I, II, and III.

We again thank the firms and managements who so generously helped us, and the Board of Trade and the Department of Scientific and Industrial Research whose financial assistance made the study possible. The responsibility for the content of the articles is entirely ours.

Overhead costs are defined as including all current factory costs incurred in motor production other than i. those associated with the materials incorporated into the finished products (see article II), and ii. the cost of the direct labour whose job is that of doing the manufacturing operations necessary to make motors (see article III).[1] Overhead labour includes all factory employees other than direct labour.[2] In these factories, overhead costs were between two and two and a half times as high as direct labour costs. There were as many overhead workers as direct workers, and much more than half the labour bill was paid to them. Statistically, it was more important to economise on overheads than on direct labour.

Table I brings together the best estimates that can be made of comparative usages and costs for direct labour and overheads in the first half of 1954. B, despite the fact that it produced a more complicated output, used fewer man-weeks of labour per motor produced than the other factories, and the cost figures suggest that its usage of non-labour overheads was also lower. C was

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[1] To secure greater comparability between the three factories, the overhead cost analysed in this article will exclude expenditure on sales and design staff employed in the factories.

[2] Other than sales and design staffs.

TABLE I

Direct Labour and Overhead Costs and Usages per Motor, 1954 (1)
(B=100)

	C		D[1]	
	Man-weeks	*Costs*	*Man-weeks*	*Costs*
Direct labour (31)	96	81	133	86
Overhead labour (40)	107	75	106	79
All labour (71)	101	77	119	83
Non-labour overheads (29)	—	111	—	112
Sum (100)	—	87	—	91
Output adjuster[2]	91–98		75–90	

Note.—Figures in brackets give the percentages of total cost, excluding direct materials, at B.

[1] Measures confined to motors of designs D1 and D2, *i.e.* motors of similar size and shape to those made in B and C. See article II for a description of the designs of motors produced in these factories.

[2] *I.e.* rough indicators of the extent to which B's output would require more direct labour to make than C's or D's, both because of differences in the composition of outputs, and because of differences in the coverage of work done in the three factories. B would be more productive to the extent that relative usages per motor exceed these indicators. The indicators are derived from data presented in article III, and their meaning will not be further discussed here.

the lowest cost producer; D was not only the least productive factory, but also —if allowance is made for the amount of work it left to suppliers—the most expensive producer.[1]

Usages and costs of direct labour were analysed in detail in article III. There, we stressed that differences between factories reflected differences in their fundamental approach to production problems. As between B and C there was virtually no difference in overall direct labour productivity—or, to be more exact, their performance was so finely balanced that each had a slight edge in the production of its own output. There were, however, wide differences in productivity on individual motors and operations, which happened to cancel out in measures relating to output as a whole. Detailed analysis revealed that in each factory different ways of achieving higher direct labour productivity were emphasised. At B, the stress was on raising the rate of work even at the cost of not using techniques and methods of production which could have saved work on some motors and operations, whereas at C the stress was on saving work and the simplification of the operative's job. B achieved substantially higher rates of work, and, associated with this, its average rates of pay were also substantially higher. In consequence, its direct labour costs per motor produced were higher than C's.

The differences in direct labour productivity between D and the other two factories were, in part, attributable to more specific factors. In particular, D's wider range of output and the accompanying multiplicity of basic designs faced it with a more complex production problem. Nevertheless, it was clear that the main cause of its lower productivity was a much lower rate of work on all but simplified and repetitive operations. Low rates of work went with low rates of pay, and in fact D's direct labour costs were no higher than B's.

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[1] These statements take no account of the differences in costs and usages of materials, which were analysed in article II. If materials were included, B would probably be the most expensive producer, and C's cost advantage would be greater.

For direct labour, detailed differences in performance could only be understood in the general context of the approach to production problems adopted by each factory. We must expect that analagous unities of theme will be apparent in an analysis of overheads, and that differences of detail will again be symptomatic of differing views on how production problems could best be solved. It is, indeed, only after overheads have been brought into the picture that the advantages and disadvantages of the various approaches can be assessed. Table I shows that for overhead labour, and probably for non-labour overheads as well, B was more productive than C or D, and C was no more productive than D. The implication is that the productivity advantages of B's approach were under-estimated in a comparison confined to direct labour, and that the disadvantages of D's approach were exaggerated.

B used less overhead per motor produced than the other factories: but it paid this labour so well that its overhead labour costs per motor were higher. For overhead as for direct labour, pay differentials were such that cost relatives turned out very different from usage relatives. The pay differentials for direct labour—which were analysed in article III[1]—and for three categories of overhead labour are set down in Table II. Differentials which can be directly ascribed to differences in the composition of the wage-earning labour force in terms of sex or official skill-grading were even less important for overhead than for direct labour: calculations of pay per 'equivalent' week do not lead to substantially altered differentials. But the forms of payment adopted by the three factories do appear to have made an important contribution to the observed differentials. At B, high pay through incentive schemes covering *all* employees was a principle of labour policy. There were generous incentive schemes for direct workers; all overhead labour participated in the general monthly bonus for good factory performance, and some overhead labour also participated in direct bonuses based on the outputs of particular sections. At C, however, incentive forms of payment were confined to direct labour and to skilled men in the tool-room. For other overhead labour, payments were based on time worked rather than output produced. C's incentive scheme for direct workers was in the main a straightforward individual piece-work form of payment, and it is of course impracticable to operate such a scheme for most categories of overhead labour. D did not operate a direct incentive scheme for any of its workers, and both direct and overhead labour was paid less than at B. Its payments to direct labour were lower than C's; but some overhead labour was better paid at D than at C.

Thus the pattern of pay differentials between factories was complicated by the existence of different relationships between the pay of various cate-

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[1] Article III, pp. 260–269.

TABLE II

Pay Differentials 1954(1)

	Average pay per week (average for direct workers at C=100)			*Differentials between factories (C=100)*		*Differentials within factories (Weekly pay of direct workers=100)*		
	B	*C*	*D*	*B*	*D*	*B*	*C*	*D*
Wage-earners								
Direct	118	100	77	118	77	100	100	100
Toolroom and Maintenance ...	178	136	128	131	94	151	136	166
Other[1]	144	95	105	152	111	122	95	136
Salary-earners[2]	153	115	131	133	114	130	115	170
	Average pay per equivalent week[3]							
Wage-earners								
Direct	119	100	88	119	88	100	100	100
Toolroom and Maintenance[4] ...	126	96	92	131	96	106	96	104
Other[1]	120	85	94	141	111	101	85	107

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[1] Excluding apprentices.

[2] Excluding all personnel concerned with sales and design. The figures also exclude the manager himself.

[3] In the calculation of pay per equivalent week an attempt is made to allow for the differences in the sex and skill composition of the labour force employed. It represents the best estimate that can be made of the average differences in pay per week for similarly-graded workers in the three factories. An equivalent week is a week of male adult semi-skilled work or that number of weeks of work by other grades of labour which could on average be purchased at C for the same cost. See article III, Table XXVII, where a similar calculation of pay per equivalent *hour* was shown.

[4] These calculations are based on the assumption that apprentice-trained skilled workers may be treated as a homogeneous group. If allowance were made for the fact that skilled toolroom operatives are generally better-paid than other skilled workers, the figures in this row would be somewhat lower than those shown, thus reducing the difference in pay per equivalent week between these workers and direct workers in B and D, but increasing it in C.

gories of labour within each factory. In particular, it would appear that direct workers at C were better-paid in relation to overhead labour than in the other factories. For instance, skilled setters at C, paid entirely by the hour, received on average only 4 per cent more per hour than semi-skilled adult male piece-workers: at B, the corresponding differential was around 25 per cent, and it was even larger at D. Whereas for direct labour, payments at B were relatively high and payments at D were relativily low, for overhead labour the main contrast was the very much higher pay at B than at the other factories.

Levels of pay tend to indicate the sort of performance which is expected, and which is aimed for. A difference in the pay of overhead labour as large as that between B and the other two factories was probably associated with differences in the quality and quantity of work done by individual employees. This sort of association was found for direct labour, and it seems legitimate to expect that one reason for B's higher overhead labour productivity was that on similar sorts of work the output of individual overhead workers at B was higher than at C or D. But of course this is not something which can be measured. The comparative measurement of rates of work is impracticable even for those employees, for example machine-setters, whose work is closely associated with the actual operations of manufacture. The actual amount of setting involved in making any particular output is extremely sensitive to the detailed ordering of manufacture, which determines how many re-settings are necessary; and to the details of design and machinery availabilities, which determine how much setting work is required for each re-setting. The less closely overhead employees are associated with the actual operations of manufacture, the more important becomes the quality rather than the quantity of work. For such employees, and particularly for staff exercising responsibility for the work of others, numerical measures would anyway be rather inappropriate. All we can do is to suggest that in so far as the factories' organisation required similar work from overhead labour, there was some reason to expect better performance from B's personnel.

But the similar job was more of an exception than might be supposed. Differences in overhead organisation were just as pronounced as those in the organisation of manufacture. In part such differences arose directly from the manufacturing differences; for instance, the decisions at C and D to make components for stock involved the employment of staff to look after stocks. Similarly, the incentive schemes of payment to direct labour at B and at C required the employment of staff to record output and to work out the payments due to individual workers. Moreover, differences in the labour employed on apparently similar functions were often far larger than could reasonably be attributed to any differences in the personal effectiveness of the employees concerned. For direct labour, too, the similarly performed operation was the exception: but the degree of incomparability in work done by overhead labour was even greater. The detailed study of the sources of overhead labour productivity differences is therefore much more a study of the consequences of different forms of organisation than of differences in work-rates and other quality factors.

In later sections we shall concentrate on an analysis of differences in overhead labour productivity. The quantitative importance of non-labour overheads—in B, the cost of overhead labour exceeded that of non-labour overheads, but the reverse was true for C and D—would seem to require that they be given equal weight in a full comparative analysis of overheads. There are, however, good reasons for not undertaking a detailed study of non-labour overheads. For some overheads, comparisons are simple; but the results of the comparison are of no general interest whatsoever. Differences in the cost of the factory site when one factory owns its site and another rents it; differences in the fuel bill when one factory inherited a highly inefficient heating system: discussions of differences like these, which reflect some historical accident, cannot be helpful. For yet other non-labour overheads, the task of securing even a rudimentary comparability between factories—for items like miscellaneous shop supplies, or sundries—is such that no generalisation which might emerge could possibly justify the effort involved.

The most important non-labour overhead costs which cannot be put to one side for one or other of these reasons are those associated with the use of equipment, which amounted, at B, to nearly one half of non-labour overhead costs. A comparison of machinery depreciation costs was attempted in the study of shaft manufacture.[1] B's solution to shaft manufacturing problems was shown to be associated with very substantial savings on machinery, stemming both from its decisions on the techniques and organisation of manufacture to be used for the production of a varied output, and from the high rate of machinery utilisation made possible by high rates of work. D, with its low overall rates of work, differentiated techniques, and more cumbersome designs, had to employ nearly three times as much machinery per shaft produced; and C, with its differentiated techniques, and its policy of preferring idle machine time to idle labour time, had more than twice as much machinery installed per shaft produced. The figures for depreciation of machinery and plant as charged in the factories' accounts suggest that the findings for shaft manufacture were very atypical. Yet it is certain that direct comparison of accounting charges would be seriously misleading. B's charges were high relative to those of other factories partly because its machinery was, on the whole, newer; but mainly because it had revalued all its machinery only three years before.[2] D's charges were low mainly because it left to suppliers some operations which other factories did for themselves.[3] We have made no attempt to produce comparable estimates of depreciation costs, but we are sure that such estimates would confirm that B's savings were substantial.[4] No-one who visited the three factories would be likely to challenge this assertion.

The importance of this saving must not be exaggerated. Even though B's charges were relatively high, depreciation costs did not account for much over a third of the non-labour costs associated with equipment. Costs associated with provision of new or replacement tools, dies, and jigs for the machinery were about as high as depreciation costs; and further substantial costs were incurred in the maintenance and repair of machinery. Here again, the problems of securing comparability between factories are forbidding, but it seems that B did not achieve any major economies on these other costs. There is no real inconsistency between B's savings on depreciation and its failure to save on other non-labour costs associated with the use of machinery. The approach which made it possible to economise on machinery installed also required that this machinery and the associated equipment should be in tip-top condition, and that every opportunity for more effective utilisation should be exploited.

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[1] Article III, pp. 201–215.

[2] For shaft production machinery, depreciation charges based on replacement costs exceeded charges based on original or revalued cost by 25 per cent at B, by 85 per cent at C, and by 72 per cent at D.

[3] Two of these operations—lamination stamping and endshield diecasting—were particularly capital-intensive.

[4] We do not propose to discuss the problem of which method for assessing the current cost of machinery may be most appropriate for inter-factory comparisons. Certainly the method we used for shaft machinery comparisons—taking a proportion of the replacement cost of the machinery installed—is far from satisfactory. For example, it exaggerates the cost of retaining machinery in a stand-by role. It was arbitrary, as any method must be: but at least it was consistent for the three factories. Accounting charges are arbitrary, and may in addition reflect (as in these three factories) major differences in methods of charging and in coverage. What we are suggesting is that on *any* consistent and not unreasonable basis of assessing machinery depreciation costs, B would show costs lower than the other two factories.

In the inter-factory comparisons of overhead labour productivity, similar —but rather better-documented—conclusions will emerge. B's higher overhead labour productivity did not imply *general* economies in usage: rather the pattern was one of lower usage in certain specific directions, partially offset by higher usage in other directions. This sort of pattern was found in the analysis of material usage in article II. Evidently generalisations about differences in overhead labour productivity derived from an analysis of usage in a single period are more suspect than analagous generalisations for direct labour or materials, since overhead labour productivity is more likely to be influenced by short-run factors: a temporary fall in demand, for example, is likely to be associated with temporary 'excess' usage of overhead labour. This warning is given particular force by a consideration of developments in these factories over the years 1952–54. In 1954 (1) B's overhead labour productivity was higher than C's or D's: in 1952 (1) it was lower. A study of how this reversal occurred helps to identify the sources of changes in overhead labour productivity, and gives some historical perspective to comparative figures for a particular period.

CHANGES IN OVERHEAD LABOUR PRODUCTIVITY

In this section, analysis will be based on (a) the changes in usage of overhead labour in each factory and (b) a comparison between those changes and the changes in the usage of direct labour. The usages are for the factories' output as a whole, and not just for the output of comparable F.H.P. motors. We do not, therefore, make direct estimates of changes in overhead labour productivity: inferences about the changes which occurred have to be based on a knowledge of changes in direct labour productivity *on comparable output* and a knowledge of changes in the usage of overhead labour in relation to the usage of direct labour *on output as a whole.* Such inferences cannot be very secure, particularly for B (where comparable output accounted for less than a third of total output) or even for D (where the proportion was about two-thirds).[1] Yet the changes in the ratio of direct to overhead labour usage shown in Table III are sufficiently sharp to leave no doubt that there were major changes in overhead labour productivity over time, and that these changes were not uniform for the three factories.

In early 1952 each factory was working at or near full capacity. The ensuing slump affected all factories; but it was much milder at C than at B or at D, and the recovery at C was also more vigorous than elsewhere. By early 1954 C's output was well above early 1952 levels—more output was being obtained from the old lines, and a new line had come into operation. D's

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[1] See *Note* to Table III.

TABLE III

Changes in Overhead Labour Usage
(Usage and productivity in each factory in 1952 (1) = 100)

	Direct labour usage, all factory output (1)	*Overhead labour usage, all factory output* (2)	*Ratio of direct labour usage to overhead labour usage, all factory output* (3) (1 ÷ 2) × 100	*Direct labour productivity, comparable FHP motors* (4)
1953 (1) as percentage of 1952 (1)				
B	59	66	89	107
C	80	96	83	103–4
D	48	85	56	112–3
1954 (1) as percentage of 1953 (1)				
B	164	136	121	106
C	131	115	114	110
D	132	113	117	111
1954 (1) as percentage of 1952 (1)				
B	98	90	109	114
C	105	109	96	113–4
D	63	96	67	124–5

Note.—If it were the case that all factory output was of comparable F.H.P. motors, an estimate of the change in overhead labour productivity could be obtained by multiplying the known change in direct labour productivity, *i.e.*

$\frac{\text{change in output adjusted for compositional effects}}{\text{change in usage of direct labour}}$, by the ratio

$\frac{\text{change in usage of direct labour}}{\text{change in usage of overhead labour.}}$ The assumption involved in such an estimate is that the adjustment for the effects of a changed composition of output appropriate for the calculation of direct labour productivity is also appropriate for the calculation of overhead labour productivity. This assumption was discussed in article I (pp. 178–182) where we suggested that more elaborate alternative techniques may not yield improved indicators of performance.

All factories in fact produced outputs other than comparable F.H.P. motors: we have not calculated the changes in direct labour productivity for output as a whole, nor have we (for the inter-temporal analysis) attempted to allocate overhead labour between comparable and non-comparable outputs. The information at our disposal would only permit an estimate of overhead labour productivity on output as a whole if it could be assumed that the change in direct labour productivity on total output was the same as that on comparable output; and it would only permit an estimate of overhead labour productivity on comparable output if it could be assumed that the proportion of overhead labour used on comparabe output was the same as the proportion of direct labour used on comparable output (*i.e.* that the ratio between the two usages was the same for comparable as for total output). For a factory like C, where comparable output accounted for nearly 90 per cent of total output, neither assumption would be very wide of the mark. For a factory like B, where comparable output accounted for less than a third of total output, either assumption would obviously be very dangerous. We happen to know that an assumption of equal productivity increases for all products would be false; the equi-proportional allocation assumption can hardly be correct, but may not be so wildly misleading as might be suspected. So inferences about changes in overhead labour productivity on the basis of the information shown in this Table cannot be secure—and are perhaps less insecure if interpreted as inferences about changes in overhead labour productivity on comparable output than if interpreted as inferences about changes in overhead labour productivity on output as a whole.

output, however, was still down on earlier levels; B's output of comparable F.H.P. motors was also down, but factory output had increased partly because new products had been introduced.

In all three factories direct labour productivity on comparable F.H.P. motors rose both in the slump between 1952 (1) and 1953 (1), and again in the recovery between 1953 (1) and 1954 (1). On general grounds, one would not expect a similar pattern for overhead labour productivity, as, over short periods, the usage of overhead labour seems likely to be more stable than that of direct labour. In particular, one would not expect that in a slump reductions in overhead labour usage would be as large as those in direct labour usage, and it is surprising to find that in one factory they very nearly were. At B a 41 per cent cut in direct labour usage between 1952 and 1953 was accompanied by a 34 per cent cut in overhead labour usage. As a consequence, it is probable that overhead labour productivity at B fell only slightly, despite the severity of the slump. At D, however, a halving of direct labour usage was accompanied by a modest reduction in overhead labour usage, and overhead labour productivity fell sharply.

In the recovery from 1953 to 1954, overhead labour usage increased much less rapidly than direct labour usage, and in each factory overhead labour productivity appears to have risen very sharply—by 15–20 per cent *more* than direct labour productivity. B's increase was probably no smaller than that of the other factories, despite the fact that it had avoided any serious fall during the slump. Over the whole period 1952–4 B secured a markedly larger increase in overhead than in direct labour productivity: in 1954 much the same direct labour force was being served by a 10 per cent smaller overhead labour force. At C and D, overhead labour usage was more stable in slump and recovery: but whereas at C the increase in output over the period was such that the rise in overhead labour productivity fell little short of that in direct labour productivity, at D the recovery in output following the severe slump was so limited that there was a sharp decline in overhead labour productivity.[1]

These summary figures do indeed show that in all factories overhead labour usage changed less sharply in slump and recovery than direct labour usage, and that because of this relative stability overhead labour productivity fell in the slump and rose in the recovery. But more interesting than such confirmations of obvious generalisations is the clear evidence of differing reactions to short-term output fluctuations in the three factories, and the suggestion that those reactions influenced the level of overhead labour productivity over longer periods. It seems unlikely that B would have achieved such a substantial gain between 1952 and 1954—a gain which probably turned it from the least productive user of overhead labour to the most productive—if there had been no intervening slump.

Let us now look at some of the details. Overhead labour—defined as any labour other than that whose main task is the making of the output—is a

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[1] If it were legitimate to allocate the same proportion of overhead labour as of direct labour to comparable F.H.P. induction motors, the productivity of overhead labour at D in 1954 would have been 124–5 × .67, or 83–4 per cent, of its 1952 level. Despite the sharper rise in direct labour productivity, the productivity of all labour (direct *plus* overhead) rose much less over the period at D than at the other two factories.

TABLE IV

Analysis of Changes in Overhead Labour Usage
(1952(1)=100)

		Overhead labour			Direct
	Total	Indirect	Allied	Salaried	labour
B 1953 (1)	66	61	81	61	59
1954 (1)	90	94	104	80	98
C 1953 (1)	96	95	100	94	80
1954 (1)	109	113	118	97	105
D 1953 (1)	85	60	91	93	48
1954 (1)	96	69	129	92	63

composite hotch-potch of workers with very different jobs. The factory manager is included, and so are the factory cleaners; the foremen are included, and so are the gatemen. The subdivision of overhead labour shown in Table IV is very coarse: but it will suffice. The most homogeneous group shown is that we call allied labour, which consists largely of skilled manual operatives who work in the toolroom or on the maintenance of equipment, buildings and fittings. Indirect labour is defined to include all other wage-earners—testers and inspectors, setters of machines, store-keepers and other stores labour, factory cleaners, etc. Salaried labour is a broad category covering all clerical and technical office staff, together with management and all salaried supervisors.

In all three factories usage of *allied labour* was higher in 1954 than in 1952. At C and D, the sharp rise could be attributed to recent developments. At C there was the need to tool up the new line; and at D the need to tool up for the new design D1 was also important, though probably not as important as the decision to start the stamping of laminations within the factory. In both factories there seems to have been a general policy decision to step up the resources devoted to technical development, and it is to some extent accidental that the additional work for allied labour took the particular form it did: generally speaking, highly-skilled tool-room labour will not be taken on merely for a temporary assignment like tooling a new line. When so much of the increase in usage was associated with development work, it is clearly not relevant to assess the performance of this labour in relation to current output. Nevertheless, it is notable that C, because its output had increased so much, was able to step up development work without increasing its allied labour very much more than its direct labour. But at D, where the increase in the usage of allied labour was not all that much greater, there were twice as many allied workers in relation to direct workers in 1954 as in 1952. A policy of increasing the resources devoted to development must be expected to bring benefits in the longer run: but the increase in current costs is much easier to bear when output is growing.

The expansion of development work also affected *salaried labour* at C and at D. In both there was some rise in employment of salaried engineering staff (draughtsmen and others), which somewhat masked the size of the decline in

TABLE V

The Salariat Cuts at B
(Percentage changes)

	1952–3	*1952–4*
Men		
Floor supervisors[1]	−58	−47
Staff in ancillary[2] departments	−43	−19
Maintenance and toolroom staff	−27	−18
Administrative departments	−30	−11
Women		
Operative departments	−56	−38
Administrative departments	−43	−21
Weekly-paid staff[3]	−48	−26
Monthly-paid staff[3]	−14	− 7

[1] Includes male clerical staff working on the factory floor.
[2] *I.e.* inspection, stores, and despatch.
[3] A classification of the salariat alternative to that shown in the upper portion of the Table.

the non-engineering salaried staff more closely concerned with the day-to-day problems of manufacture. But even so the reductions were minor in contrast to those at B, and it seems that at both C and D the main determinant of changes in the productivity of the non-engineering salaried staff was the level of output. Its productivity fell sharply at D because output did not recover to the 1952 level, and rose sharply at C because even the installation and bringing into operation of a totally new manufacturing line in a new building had not required the recruitment of extra non-engineering salaried staff.

Recently, attention has been drawn to the tendency for ' excess capacity ' to appear in the salariat, as organisational and technical problems are overcome.[1] Such excess capacity can be absorbed if output grows, or products change, sufficiently rapidly; but, if such changes do not occur, it is unlikely that the excess capacity will be at all obvious. There are always improvements to be made and problems of lower priority to be tackled; and even if excess capacity is suspected, any substantial reduction in salaried staff must involve some reorganisation of duties. In an evenly-developing situation, it may be thought that the attempt to eliminate excess capacity would create more disruption than could be justified by the potential savings: the alternative of enlarging the functions and responsibilities of salaried staff will appear more attractive. But a sharp slump could provide the opportunity to squeeze the salariat, and to reduce excess capacity by restricting recruitment in the recovery to those sections where strains become apparent. Such a solution requires from management a ruthlessness in salaried employment policy that is probably not characteristic of British industry. It is not easy to imagine that many factories would choose, as B did, to shed 40 per cent of their salaried staff over a twelve-month period. Table V shows that the only group to escape with only minor reductions was the monthly-paid staff—broadly, the upper cadre of management. The weekly-paid staff was nearly halved. This was not just a matter of dispensing with typists: the cut in male staff was almost as severe as that in the female staff, and in general the cuts were heaviest for salariat working on or near the factory floor.

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[1] E. T. Penrose, ' *The Theory of the Growth of the Firm* '.

In this ' adjustment ' the factory dispensed with the services of experienced and fully-trained staff—many of whom would have to be replaced when the recovery came. The recovery was confidently anticipated: it was not supposed that the decline in output was other than temporary. Only a factory which paid well could have the confidence that replacements could be obtained as and when required; and only a factory in which a co-operative spirit was strong could make adjustments of this magnitude without serious effects on morale.

In the study of direct labour productivity over time at B, it became clear that the recruitment of green direct labour in the recovery had seriously inhibited productivity growth[1]; and there is no reason to suppose that the recruitment of green overhead labour did not have similar short-run consequences for the quantity and quality of work done. Against this, however, it is possible that sacking on such a scale enabled the factory to get rid of labour which was good, but not good enough: and that it had a stimulating effect on those who survived. One may believe that there should be other ways of inculcating a sense of urgency; but stability in salariat may have its price if it is associated with a confident expectation that, provided you do a competent job, your services will not be dispensed with except in dire emergency.

The work of some *indirect labour* is more closely dependent on the level of output than that of allied or salaried labour. For instance, the work of testing motors will rise and fall roughly *pari passu* with output; and so too will the setting work to be done, although of course the tendency in a slump for the demand for bulk-production motors to fall off more than that for ' special ' motors will tend to raise the ratio of setting to production work. But although a factory may be willing to cut back its employment of less skilled and specialised indirect labour when output falls, it will probably wish to retain the services of skilled setters, competent charge-hands, and experienced store-keepers, even if they are temporarily under-employed. On balance, one would expect the usage of indirect labour to fall and rise in slump and recovery, but less sharply than the usage of direct labour; and the changes which occurred in each of the factories were consistent with this expectation. Even so, over the period as a whole the same contrasts emerge as for salaried labour, only much less strongly. The faster growth in indirect than in direct labour productivity at B has in the main to be attributed to its greater willingness to shed labour in the slump, confident in its power to attract it back when necessary.

In one factory, C, we attempted a more detailed analysis of indirect labour. The results showed how varied were the changes for smaller and more homogeneous groups. In the slump, for example, there were major reductions

[1] See article III, pp. 220–1.

in testing and inspection labour, but no setters or storekeepers were dispensed with. Indirect labour productivity at C rose more slowly than direct labour productivity between 1952 and 1954 because increases in the productivity of some groups of indirect labour greater than that in direct labour productivity were more than offset by smaller increases for other groups. No useful purpose would be served by giving all the details: but the variety of the changes for particular groups should be emphasised. For indirect labour, and many other categories of overhead labour as well, any generalisations about usage or productivity changes in relation to, say, output changes, do not imply that there are any necessary or automatic relationships.

The closer overhead labour is to the actual process of production, the more obvious will be the possibilities of shedding labour as output falls and the more obvious the need to recruit labour as output rises. Increases in the productivity of overhead labour working on or near the production lines, *e.g.* most indirect labour, have to be worked for: the problems are much the same as for direct labour, and the opportunities for success at least as great. The further overhead labour is from the process of production, the less obvious will be the possibilities of shedding, or the need to recruit, labour in response to short-term fluctuations in output. Not a few managerial departments will find themselves busier when output is falling than when it is rising. In any case, the short-term advantages of stability in the employment of allied or salaried labour seem great: much of the labour is skilled and specialised; and it fits into an organisational structure which cannot easily be tampered with. For longer-term changes in output, it might seem that this is the sort of labour for which productivity can most easily increase as output rises, and for which a fall in productivity as output declines can hardly be avoided. The changes in the productivity of the salaried labour at C and D can be understood in these terms; but the changes in the salariat at B should provide a warning against any too simple generalisations. Given a ruthless personnel policy and a willingness to undertake any necessary re-organisation of functions and responsibilities, a fall in productivity is not inevitable if output declines. Higher productivity of allied or salaried labour is certainly not an inevitable consequence of an expansion of output: indeed the expansion itself will throw up technical and organisational problems which allied and salaried labour have to solve, and if higher productivity is in fact achieved, this will to some extent reflect an increasing competence of such staff. Furthermore, it may be a short-sighted policy to attempt to secure the potential productivity increases for allied or salaried labour: the alternative of enlarging the functions and responsibilities of that labour could be more rewarding in the longer run. The nature of this alternative will be illustrated in the next section, in which we compare the work done by overhead labour in the three factories.

INTER-FACTORY COMPARISONS OF OVERHEAD LABOUR PRODUCTIVITY

Relevant comparisons of the overhead labour used in the three factories have to relate to usage on comparable output. Some overhead labour—e.g. most of the indirect labour working on the factory floor—was specific to particular products; but some—e.g. most labour working in office departments—served the factory as a whole. At C, comparable output accounted for some 90 per cent of total factory output; at D, the proportion was about two-thirds; and at B under a third. Inevitably an allocation of non-specific overhead labour between comparable and non-comparable output must to some extent be arbitrary. In our allocations, we have made use of some information on how the work of non-specific overhead labour was divided between comparable and non-comparable output:[1] if such information was not available, we have based the allocations on the distribution of direct labour usage between comparable and non-comparable outputs.

Some economies of scale are to be suspected for overhead labour, and one of the problems of analysis is that there are at least two scales which may be relevant. For labour specific to comparable output, the scale most likely to be relevant is that of comparable output: C was the largest producer, and B was not much larger than D. For labour not specific to comparable output, joint usage may imply that economies of scale can be achieved on factory output as a whole—particularly since most of the non-comparable output had much in common with comparable output. If all factory output is included, B was by far the largest producer and D by far the smallest.[2] In 1954, B was substantially the most productive of the three factories in its use of overhead labour on comparable output. Although its comparable output was somewhat more complicated than that produced by the other factories, its usage per motor was lower. Yet it is clear from the detail of the Table VI that no simple interpretation of B's productivity advantage in terms of economies deriving from its larger factory scale is possible. Economies of factory scale would be likely to appear in the office departments we group under the heading of control: but B's usage per motor was higher than that of the other factories. Its main advantage appeared in the usage of supervision, shop and stores labour specific to the comparable output which it produced on a much smaller scale than C. Evidently the relevance of scale

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[1] An example of this sort of information is given in the *Note* to Table VIII.

[2] Rough orders of magnitude for relative scale were:

	B	C	D
Comparable output	4	7	3
All output	7	4	2

The scale for all output at D relates to all outputs from the manufacturing unit in which comparable outputs were produced. There were other manufacturing units on the same factory site, with their own overhead departments. The only overhead departments of any importance serving all units on the factory site were the personnel and accounting departments. The scale for comparable output relates to the output of F.H.P. motors of designs D1 or D2 only: all comparisons in this section will refer to usage on those two designs.

TABLE VI

Overhead Labour Usage, 1954 (1)
(*Employment of overhead labour per motor as percentage of total employment of overhead labour per motor at B*)

	B	*C*	*D*
Indirect labour:			
Inspectors and testers	20	20	22
Supervision, shop and stores	19	26	28
Allied labour	25	24	24
Control labour	28	26	20
Miscellaneous labour	8	11	12
All overhead labour	100	107	106

Note.—A complete enumeration of the classification of overhead employees used in this table would serve no useful purpose. Broadly, the categories are similar to those in Table IV, adjusted to achieve greater comparability of function between factories. As before allied labour means toolroom and maintenance workers. Indirect labour consists of most other (hourly-paid) wage-earners; and control labour of (weekly- and monthly-paid) salary-earners; but some transfers have been made. For instance, indirect labour includes any salaried floor supervisors and control labour includes wage-earning chasers. In addition, there have been transfers to the miscellaneous category in order to achieve rather greater homogeneity of function in the other categories.

differences cannot be understood without an analysis of the way in which overhead labour was used in the three factories.

Two of the categories of overhead labour shown in Table VI will not be discussed in any detail. Miscellaneous labour is a rag-bag category including gatemen, apprentices, instructors, telephone operators and factory cleaners. The usage figures suggest that some economies of factory scale were achieved on this labour, but further analysis would not be rewarding. There were no major differences in usage per motor for the more important category of inspectors and testers. This uniformity certainly does not imply that similar work was done in similar ways in the three factories. There were differences in the number of test and inspection points, in the techniques of testing, in the variety of motors to be tested and inspected, and so on. A full comparative analysis would hardly be less complicated than the comparative analysis of direct labour in article III: and we do not have the necessary information. For the remaining three categories, however, we may hope to elucidate some of the consequences of differing approaches to production problems, and of differing scale.

Supervision, Shop and Stores Labour

This category comprises those workers on the factory floor directly controlling or serving the workers who do the actual job of manufacture. B's productivity advantage was marked, and Table VII shows that savings in usage were achieved on each of the four groups of workers in this category.

B's savings on *stores labour* had a straightforward explanation. At C and D it was normal practice to manufacture most major components for stock,[1] and in both factories there were stores of components, with storekeepers to look after them. At B, however, such stores were not needed, since it was

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[1] This statement is subject to qualifications. Neither manufactured ' special ' components or assembled stators for stock; and there was less manufacture for stock on the new line at C, and for the new design at D, than on the old line and for the old design.

TABLE VII

Usage of Supervision, Shop and Stores Labour, 1954 (*1*)
(*Employment of supervision, shop, and stores labour per motor as percentage of total employment of supervision, shop and stores labour per motor at B*)

	B	*C*	*D*[1]
Stores labour	23	32	46
General shop labour	19	28	19
Sub-totals	*42*	*60*	*65*
Setters	32	40	30
Supervisors	26	37	51
Sub-totals	*58*	*77*	*81*
All supervision, shop and stores labour	100	137	146

[1] For D, the difficulties of ensuring comparability of function with analagous labour in other factories are such that the sub-totals are the only valid comparative data.

normal practice to confine component manufacture to the immediate needs of the motor assembly programme. Savings on stores labour, and inventory, were unequivocal advantages of B's organisation of manufacture; but these savings could not of themselves justify that organisation. *Vis-a-vis* C, the saving in stores labour was roughly equivalent to a two per cent saving in direct labour usage; and the lower inventory, even if charged at an interest rate of 10 per cent per annum, could only have saved about 1 per cent of total manufacturing cost excluding direct materials. These were minor savings, easily offset by a single year's growth in direct labour productivity. The crucial advantages and disadvantages of the different organisations must be looked for elsewhere. B and C were roughly equal in direct labour productivity; the advantages of C's organisation in permitting larger batches, a more effective utilisation of specialised techniques, and a segregation of manufacturing facilities, were counter-balanced by B's success in achieving a fast flow of work down its single line. Since there were no intermediate official stock points at B, the flow of work could only be maintained if components were produced in precisely the variety and quantity called for by the production programmes for later stages of production. As a consequence the production of components had to be more rigorously controlled by office departments than at the other factories.

A main function of *general shop labour*—truckers, labourers, etc.—was the movement of materials, components, and motors into stores or to the points at which further work had to be done on them. B saved labour[1] partly because its much more compact single-line organisation made less movement necessary. Here again, however, broader issues are involved. At B, inventory was low not only because there were fewer official stock-points, but also because 'unofficial' stocks were lower. On a visit to the floor the second dominant impression—the first was the economy in machinery installed—was the small amount of work-in-progress lying around. The disciplinary effect of low official stocks was not reduced by the accumulation of unofficial stocks. Effective handling of materials and components was therefore a prerequisite for smooth working, and the importance of this work made it essential that it was properly organised. Whereas at C and D the workers who moved materials and components were under the authority of shop and stores foremen, at B an office department was directly responsible for all handling of materials and components on the floor. Thus the way in which B organised production saved both stores and general shop labour; but it also implied a tighter and more comprehensive control by office departments, about which we shall have more to say later.

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[1] In Table VII, D is shown as having the same usage of general shop labour per motor as B. But at D, more of the movement of materials from stores to floor is done by stores labour, and only the sum of stores and general shop labour provides a valid basis for comparison.

For *setting and supervisory* labour, it is easy enough to understand the usage differences between B and D. The latter's lower machinery and labour productivity meant that there were more machines, and more labour, to supervise per motor produced.[1] Because D had difficulty in recruiting skilled setting labour, supervisors had to spend some of their time re-setting equipment. They got comparatively little help from the office departments, and had to take decisions not only on when components should be manufactured, but also, sometimes, on how to manufacture them. Despite a relatively high usage per motor, D's supervisors seemed to be overloaded, and the basic supervisory functions of easing bottlenecks and speeding work tended to be neglected. This had serious effects on direct labour productivity in a factory where the absence of any direct incentive form of payment, and of any adequate scheme of operative training, made thorough supervision vital.

As between B and C, the reasons for differing usage are not so simple. B had the more varied output, and there was much less batching to reduce the variety to be produced in any week. So there was probably[2] more setting work to do at B than at C, and yet usage was lower at B. Setters at B were particularly well-paid because they participated in the incentive payments made to the direct workers operating the machines they re-set; but it was probably as important that they had to work under pressure. If output was to move smoothly through the limited machinery available, re-setting delays had to be minimised, and, as with material and component handling, the urgency of the job probably contributed to a more effective organisation of work. At C, on the other hand, a comparatively abundant supply of machinery and of work-in-progress meant that re-setting delays would have much less disrupting effects on the flow of work.

Supervisors are the link between the office departments controlling production and the workers on the factory floor, and the sort of work that supervisors were called upon to do depended in part on the way in which production was organised, and in part—as has already been noted for D—

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[1] D's employment of setters and supervisors per motor produced was very much higher than B's: but its employment of setters and supervisors per direct labour employee was only slightly higher.

[2] It has already been noted that the measurement of setting requirements would require a much more detailed study than we have undertaken. To some extent the effects on setting requirements of the greater variety of weekly output at B will have been offset by its greater degree of component standardisation.

on the way in which office departments tackled their jobs. At C, the most varied portion of output was segregated, so that the main manufacturing lines were to a considerable extent insulated from market pressures for variety. Component manufacturing sections were further insulated from the detailed requirements of the motor assembly programme by the practice of producing components for stock. Less variety and bigger batches contributed to an easing of the supervisors' task of ensuring a smooth flow of work through their sections. On the other hand, it was C's practice to leave some considerable freedom for manoeuvre—particularly in component manufacture—to the factory floor. All supervisors have to take spot decisions as particular production problems arise: at C the scope of such decisions was greatly enhanced by the existence of alternative manufacturing facilities, and by a willingness to hold stocks—official and unofficial—at a level which permitted some flexibility in the arrangement of work in a section.

At B the situation was very different. There was no segregation of manufacture, no intermediate official stock-points, and unofficial stocks were kept very low. In consequence each manufacturing section had to produce as varied a weekly output as was required by the motor assembly programme. Because variety was so much greater than in most sections at C, the task of ensuring a smooth flow of work was more difficult. But the scope for alternative supervisory decisions was considerably narrower than at C. If disruption of later stages of production was to be avoided, weekly production programmes had to be fulfilled in detail: *ad hoc* modifications of office decisions on the floor could not be permitted. Office departments controlled production in greater detail than at the other two factories, and in so doing assumed responsibilities—material handling for example—which elsewhere lay within the province of supervisors. Supervisors at B were therefore able to concentrate their efforts on speeding the flow of work through their sections, and on one test the practice of restricting the scope of supervisory work easily justified itself. In 1954, fewer supervisors got more work from fewer men and fewer machines, and were able in addition to cope with a considerable variety of output on a single fast-flowing line.

B had reduced its supervisory labour force very sharply over the previous two years: there had been a drastic cut in the slump, and only a modest increase in the recovery.[1] It is at least possible that a heavy investment in supervision was necessary to solve the problems of producing a varied output on a single line, and that once the line was working smoothly the need for supervision declined. A labour force adaptable enough to produce a varied output will be adaptable enough to cope with many of the day-to-day production snags, and to adjust itself to changes in required output or production techniques, with a minimum of detailed supervisory help. A labour force producing a less varied output will have less opportunity to become adaptable, and will tend to rely more heavily on the experience of supervisors when snags appear or when adjustments are required. For this reason—and because

[1] See Table V.

supervisors had broader responsibilities—a similar reduction in supervisory labour at C would hardly have been possible without serious adverse effects on the flow of work and on productivity.

For each group of labour in this category, B's savings were intimately associated with its approach to production problems. The simplicity of a single-line organisation, the pressures to maintain a flow of work down that line, and a tight control by office departments, combined to permit substantial savings in the labour working on the floor but not actually engaged on production.

Allied Labour

The usage per motor of allied labour—mainly highly-skilled toolroom and maintenance workers—was, in 1954, very similar in the three factories. This labour was employed partly on the routine jobs involved in the maintenance and repair of plant, machinery and fittings, and the production of replacement tools and jigs for machinery; and partly on work connected with the development of improved equipment, machinery, tools, and indeed any gadget or device to speed production. It is not in practice possible to separate out employment on routine and development work. Such a separation is sometimes made for accounting purposes (e.g. so that development work can be charged against a development budget), but attempts to work out a consistent division of expenditure in the three factories did not yield useful results.[1] Our discussion has, therefore, to be highly impressionistic.

Savings on *maintenance and repair* work would perhaps be expected at B, which had much less machinery installed per motor produced. But B's approach required that work should flow fast down its single line, and therefore required that the limited machinery installed should be in excellent condition to ensure that technical troubles did not hinder the flow. A perfectionist approach to maintenance and repair work—and a willingness to get rid of machinery that cannot be relied upon—may be expensive; but it will ease problems, and particularly supervisory problems, on the floor. C, with more ample machinery available per motor produced, could afford to be less perfectionist in its maintenance and repair work; and the evidence of a greater frequency of machine breakdowns and other technical hold-ups at D suggests that anticipatory repair and maintenance work there may have been rather less thorough, and had more often to be supplemented by emergency work. On balance, it is our impression that none of the factories achieved any significant savings on the allied labour devoted to maintenance and repair work.

Most technical *development* work is initiated by a factory's engineering staff. Skilled toolroom workers have the task of translating the drawings reflecting the ideas of the engineers into machines, tools, or gadgets of one sort or another. It should not be supposed that this task is a purely passive one: as the machine, tool or gadget is being made, snags not foreseen on the drawing board will appear; and commonly prototypes will not work as well in practice as was envisaged when the development was initiated. Skilled and experienced tool-room workers can make a very important contribution to technical development by helping to overcome the snags, and by helping to ' de-bug ' the prototypes.

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[1] A realistic separation would in any case require more detailed information than is usually available. What, for example, is the development element in the production of a slightly modified tool to replace a tool which would have to be replaced anyway?

On this sort of work, economies of scale can confidently be expected. The same projects of development, other things being equal, will use less resources per motor produced in the factory producing the larger output. This obviously applies to the scale of comparable output: and since many technical development problems were common to comparable and non-comparable output, larger factory scale should also yield economies. On the other hand, the larger the scale of particular operations, the more justifiable it will appear to be to devote resources to saving and speeding work on those operations. Thus economies of scale may show up not in a lower usage per motor of allied labour, but in the undertaking of more development work to promote a faster growth in the productivity of direct labour and machinery. We were not able, for reasons already given, to compare the usage of allied labour employed on work associated with development in the three factories. But we have no doubt that larger scale was associated with more development work rather than with economies on allied labour; that more development projects were carried through at B with its larger factory scale, and at C with its larger output of comparable products, than at D. In article III we noted C's emphasis on improved technical solutions: its multi-line organisation and its willingness to differentiate techniques offered abundant opportunities for the development of special machines, tools, and labour-saving gadgets. The scope for this sort of development was narrower at B, with its single-line organisation and uniform techniques. The evidence suggests that as a consequence there was a greater concentration on the details of standardised operations.[1] D's development opportunities were similar to C's; but its employment of allied labour in 1952 was not large enough to enable it to devote the resources required for the systematic exploitation of such opportunities, and even after the increase in employment between then and 1954 less development work could be done than in the other factories. We may conclude that not the least of the drawbacks of a relatively low scale is that a factory may not feel itself justified in devoting more than a minimum of resources to those tasks on which its future productivity will depend.

Control Labour

In Table VIII we give an analysis of comparative usage per motor in the office departments we group under the title of control. Precise comparability between factories cannot be achieved, and we must stress the qualifications

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[1] See article III, p. 248 and p. 250.

TABLE VIII

Usage of Control Labour, 1954 (1)

(Employment of control labour per motor as percentage of total employment of control labour per motor at B)

	B	*C*	*D*
Production and material control	30	40	15
Engineering control	30	25	20
Financial control	35	25	30
Other	5	5	10
	100	95	75

Note.—All figures have been rounded to the nearest five. Precise comparability cannot be secured, for the following main reasons:

1. Control labour provides factory-wide services, and an allocation of this labour to comparable output must be somewhat arbitrary. Allocations could be particularly misleading at B, where comparable output accounted for under a third of total direct labour usage. Fortunately the results of a special survey were available. At B the normal accounting procedure is to allocate office overhead costs to products *pro rata* to the direct labour required to make them. For a month in 1956, the chief accountant made a detailed survey of the work done in office departments, and found that, overall, an allocation of office costs on the basis of the information disclosed by this survey gave results very similar to those derived from an allocation based on direct labour usage. For individual office departments, however, allocations on the two bases gave substantially different results. Thus, for example, it appeared from the special survey that it would be appropriate to allocate more production and material control labour to comparable output than would be allocated on a direct labour basis. The latter allocation was misleading for production and material control labour mainly because comparable output was much more varied than any other output produced at B, so that the control problem was much more complicated. Although the special survey was only for a single month in a later year, we are certain that the allocations which it implies for individual departments are more appropriate than an allocation *pro rata* to direct labour. Accordingly, we have used its results as the basis for detailed allocations at B. No systematic information of this sort was available at the other factories: but crude adjustments to *pro rata* allocations, based on such information as we were able to collect, have been made.
2. To secure greater comparability between factories, some office labour had to be excluded. For example, design is a head office function at C, and so design staff at other factories had to be excluded. Such adjustments can never be quite adequate: when design is a factory responsibility, there is unlikely to be a self-contained design department which can be excluded *en bloc*. More commonly, design and production engineering will overlap, with each having a contribution to make to the work of the other.
3. Overhead departments in the three factories do not divide neatly into the four groups shown in the Table. Each factory organised its overhead labour in different ways, and no office department in one factory had the same functions as the most similar departments in the others. Any attempt at a more detailed functional classification would have run into insuperable difficulties.

listed in the *Note* to the Table. Nonetheless, mainly because we were able to draw on information which would not normally be available, we are confident that the comparisons shown are not seriously misleading as indicators of relative usages.

The usage of control labour per motor in 1954 was highest in B, the factory with the largest total output; and lowest in D, the factory with the smallest total output.[1] This relationship between scale and usage seems rather odd, particularly since the evidence of changes in the salariat between 1952 and 1954 pointed, for C and D at any rate, to the existence of some economies of scale for this labour. C's usage per motor in the latter year was lower principally because output had increased, and D's usage per motor was higher principally because output had decreased. These were straightforward economies (or diseconomies) attributable to a relative stability of departmental organisations and functions in the face of output changes over a relatively short period. Between factories, however, there were major differences in departmental organisations and functions which swamped the effects of differences in scale.

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[1] These office departments provide factory-wide services, and it is therefore to be expected that it is the scale of output of all products, rather than that of comparable products, which will be relevant.

Part of the story lying behind the differences in the usage of *engineering control* labour has already been told. A major function of this labour is to supervise the routine work of, and to generate the development done by, allied labour. D had recently expanded its engineering staff; before the expansion, a small staff had been so preoccupied with routine matters and day-to-day problems that little serious study of technical development potentialities had been undertaken. The expansion had the specific objective of making systematic development work possible, yet even so D's usage per motor on a much smaller output remained lower than at B or C. At these latter factories, there was a much greater margin of staff over and above that needed for the routine functions of ensuring that the machinery required for current production was available and in good order. The ways in which they deployed this staff were different: and very characteristic of the sort of developments which were stressed. One example will make the point. At C, there was a small methods development section which had no responsibilities for current production whatsoever. There was no real counterpart to this section in either of the other two factories. Freed from day-to-day worries, the section could concentrate on devising or suggesting improved methods or techniques: and we noted in article III that C had made very substantial progress along these lines.[1] At B, there was a sizeable work-study department: here again, there was no real counterpart at either of the other two factories.[2] The detailed and continuous study of individual operations made an important contribution to easing and speeding the flow of work down the line.[3] In their different ways, these factories were exploiting their larger scale not by saving engineering control labour, but by broadening the functions and responsibilities of that labour.

Similar points emerge from a comparison of *financial control* staff. Such staff has certain minimum responsibilities in the preparation of accounts and the payment of wages and other outgoings. Beyond that minimum, there are possibilities of exercising detailed financial control through, for example, cost accounting. At both C and D, financial control was of a rather general kind, and cost accounting was more a guide to inventory accounting and price estimation than a technique for detailed control. The lower usage at C may well reflect the economies achievable on a larger scale if not much more than the minimum functions are attempted. But at B, much more was attempted. The accounting departments there played a central part in the annual fixing of ' targets ' for particular operations, which provided the yardsticks against which performance was assessed.[1] Furthermore, a continuous checking of performance against the targets was undertaken, such that for any month it was possible to detect which sections, and indeed which operations, were working above or below target. On the one hand, this system could, in principle at any rate, quickly spot any weaknesses on the floor, and indicate where corrective action was needed. On the other hand, the information so collected provided a basis on which realistic targets for performance in the following year could be fixed. With performance kept under such continuous and detailed observation, it is hardly surprising that rates of work on similar jobs were higher at B than at the other factories. But accounting must be very detailed and meticulous if relevant assessments of performance are to be possible. In principle, any time not actually spent on operations, and any variation in work which could explain a variation in performance, should be accounted for; and the latter in particular is a major task for an output as varied as that of F.H.P. motors.[2] The volume of detailed information flowing into and processed by B's accounting departments was of an altogether different order of magnitude to that in the other factories. A control system of this sort requires that substantial resources be devoted to it if output is varied, and a high degree of administrative and organisational skill is required if it is to operate efficiently. For factories operating on a smaller scale, a variety of output may well discourage a similar extension of the functions of accounting departments.

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[1] As the section had only recently been set up, it would not be legitimate to attribute any of the success achieved by 1954 directly to this section. Rather it was that C had specialised in this sort of work, and the setting up of a separate section was indicative of its intention to pursue this line of advance even more vigorously.

[2] The work-study department at B made extensive use of time-studies: the detailed analysis of individual operations was undertaken with the primary object of suggesting improvements in the way in which the operations were done. Time-studies were also taken at C and D, but for rather different purposes. At C, time-studies were taken primarily for the purpose of fixing or checking piece-work prices; at D, a major purpose of time-study was the accumulation of the information required for the apportionment of costs between different motors and components.

[3] See article III, p. 222.

The *production and material* control departments are in some ways the heart of a factory's organisation. Production control is the function of issuing instructions for manufacture to proceed; material control is the function of ensuring that the requisite materials and components are available. The availability of components can only be ensured by the issue of instructions to produce those components, so that the two functions cannot be completely divorced. At minimum, the departments concerned have to ensure that the mixed bag of finished motors to meet orders which have been accepted are assembled before the promised delivery date. One way of doing this—it was the usual procedure at B—is to issue component manufacturing instructions to meet the known requirements of the motor assembly programme. The obvious drawback of this simple procedure is that the full variety in the weekly motor assembly programme is reflected in the weekly component manufacturing programmes. Alternatively, the attempt can be made—as it was at C and D—to insulate most component manufacture from the variety of the weekly assembly programme by holding stocks of components which could be drawn upon by the assembly sections. Component manufacturing instructions can then be issued as and when necessary to replenish stocks, and larger batches can be produced than would otherwise be possible. Many of the implications of this fundamental difference in the organisation of production have been noted in article III, and earlier in this article.[1] We have now, finally, to consider its implications for the departments which do the planning.

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[1] See article III, p. 218.

[2] A contrast within B is instructive. Similar accounting procedures were used for products other than F.H.P. motors. Output of other products was much less varied: mainly for this reason, F.H.P. output which only took up under a third of direct labour time took up well over one half of the detailed records of direct labour performance.

In C's planning, a relatively rigid line was drawn between a limited list of motors and components to be produced by stock replacement procedures, and all ' special ' motors. The production of the latter was not in any real sense planned by the office departments: in essence orders for special motors were passed onto the floor well in advance of promised delivery dates, and it was left to the foremen of the ' special ' line and his clerk to arrange for production. The work of the office departments was in the main concerned with arranging the flow of orders for the production of the limited list of motors and their components in a way conducive to rapid manufacture on the main production lines. Rules concerning the size of batch, appropriate re-order points, and places of manufacture left little to the discretion of the staff involved. In consequence it was possible to develop a highly effective routine of paper work, which, within its rather limited terms of reference, did ensure that most production and material control decisions were the automatic result of the routine flow of information between one office section and another. Of course the routine could not be completely inflexible. Additions to and deletions from the list of motors subject to office control were made from time to time, and rules were changed; but as a matter of policy alterations were as infrequent as possible. We did indeed note in article III that some motors were made on the special lines when the level of demand, or the minor nature of the speciality, did not appear to warrant—on any technical grounds—their segregation onto the special line. But if changes in the framework of planning had been frequent, the control procedures would have had to become more complicated, more discretionary, and perhaps less effective.

Employment per motor produced at C in these office departments was higher than in the other factories: but because so much of the work was routine it could be done by clerical labour which was not expected to take responsibility. In contrast to the other factories, C employed more women than men in these departments. The few employees in positions of responsibility, because they were not distracted by a continuous call for *ad hoc* decisions, could concentrate on organising and supervising the work of their subordinates.

The functions of the production and material control departments at C did not extend much beyond the issuing of instructions in a convenient form. True, ' chasers ' were employed to check that instructions—particularly the instructions for the motor assembly programme—were being fulfilled, and to keep the office departments informed of any difficulties or hold-ups on the floor. But the responsibilities for ensuring that the work was done efficiently, and for taking the many *ad hoc* decisions required to cope with day-to-day production problems, were clearly located in the hands of the foremen,[1] their chief the manufacturing superintendent, and the manager himself. Broadly speaking, the production and material control departments gave the floor its terms of reference, but had no major responsibility for the way in which the instructions were carried out on the floor. Such a freedom of manoeuvre, particularly in component manufacturing sections, could be given since under a stock replacement procedure it was rarely crucial for the meeting of delivery promises that a particular component should be manufactured at a particular time.

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[1] See above, pp. 319–323.

D also operated stock replacement procedures: but in many ways the planning task attempted in the office departments there was more complicated. Motors were produced to several basic designs, and within each design, components were less standardised. The production of special motors—and many more such motors were produced at D than at the other factories—was, in contrast to C's practice, controlled by the office departments. There was no rigid line drawn between standards and specials, and there was an intermediate category of ' sub-standard ' motors and components for which stock replacement procedures were followed. As an extreme example of the greater complexity of planning work, it may be noted that *ten times* as many shafts were stocked at D than at C. Nevertheless, D employed, per motor produced, not much more than a third of the staff employed at C. Naturally the staff at D was overworked; and with the best will in the world, the work of the departments could not be as effective as at C. The paper-work routine, hampered as it was by a more cumbersome system for distinguishing different motors, components, and materials, was less efficient and less reliable. It is, for instance, a basic precondition for an effective stock replacement routine that accurate information on stock levels is available in the control departments; but at D, this condition was often not satisfied, because the clerical job of keeping the records accurate had sometimes to be shelved to permit more immediately urgent work to be done. If the stock records are not completely trustworthy, and the stock level of a particular component has to be known, someone has to go on the floor to look in the stock-bin. More generally, as soon as a paper-work routine cannot be relied upon, *ad hoc* action to supplement it becomes necessary. There is, of course, a vicious circle here; the more time devoted to *ad hoc* action, the less can be devoted to making the paper-work effective.

At C, the control departments could be confident that the floor, given the materials, given the instructions to produce a convenient form, and given the freedom for manoeuvre which was allowed, would produce what they were instructed to produce so that delivery dates could be met. It is characteristic of a smoothly-running system that emergencies can be anticipated, and coped with before drastic action becomes necessary. At D, however, emergency action to ensure that delivery dates could be met was more common: the single chaser employed frequently had the task of finding out why a programme had not been fulfilled, and on the basis of this information steps had to be taken to push through the ordering or manufacture of particular parts, components, or motors. The initiative for such action had to come from the control departments, since theirs was the ultimate responsibility for ensuring that delivery dates could be met. One reason for non-fulfillment may have been that the programmes themselves were unrealistic: production programmes cannot be fulfilled if the requisite materials or components—or indeed labour—are not available. Furthermore, the more production is disrupted by emergency action to push through this or that component or motor, the more complicated becomes the supervisor's task of producing efficiently that which he is called upon to produce. We have already noted the heavier responsibilities carried by supervisors at D, and can now see that this was in part a consequence of the way in which control procedures worked out. There was hardly any contrast between C and D so striking as that between the relaxed atmosphere of control departments at the former, based on the confidence that their routine coped with most situations and that emergencies could mostly be anticipated and dealt with on the floor; and the flurry in the latter's departments as emergencies added to the load of work in understaffed departments.

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[1] See above, p. 322.

B, by contrast with C and D, made no attempt to ease production problems of component manufacturing sections by insulating them from the variety of final output.[1] Furthermore, it manufactured all motors on a single production line, and on that line there was very little differentiation of techniques. There was therefore no need to take decisions or make rules about which motors should be treated as standard and which as special, about which motors or components should be made on what line or by what technique of production, about the appropriate level of stock for each component, or about the size of batch for each component manufactured for stock. Decisions or rules on these subjects formed the basis for control procedures at C and D. At B, the formulation of component manufacturing programmes involved little more than the straightforward clerical job of recording the components required by a final assembly programme. This comparative simplicity of planning procedures saved much clerical labour and much routine paper-work.

But it is not much of an exaggeration to say that the main job of production and material control at B started where C's left off. The control departments assumed responsibilities not only for ensuring that production programmes were fulfilled in detail, but also—and this was crucial for B's approach—for ensuring that pressures for improved performance from men and machines could be effective. To these ends, the floor was kept on a tight rein. A distinguishing feature of B's procedures was the amount of information flowing from the floor into the control departments: chasers played an important part in relaying detailed information on the progress of work through the manufacturing sections. Without such a feed-back of detailed information, comprehensive control of a varied output could not have been attempted. Several aspects of this control have already been noted: material handling on the floor was the responsibility of an office department; supervisors had more limited responsibilities because office departments had wider responsibilities. The scope and influence of the control departments was reflected in their relatively high status in the factory's organisation. The more ambitious control attempted at B could not be routinised to the extent the control was routinised at C: a higher proportion of the staff had to be capable of initiative, and be able to take responsibility. Employment in production and material control departments per motor produced was lower than at C: but the cost of such staff was much higher at B not only because general pay levels were higher but also because the nature of the responsibilities required the employment of staff of rather higher calibre.

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[1] Though its greater standardisation of design did help to reduce component variety.

Our discussions of control procedures have given some indication of the possibilities for extending the functions and responsibilities of control departments. Such extensions are intended to have, and in general do have, favourable effects on the productivity of direct labour and machinery. But they are not costless: the more ambitious the control objectives, the more resources—and in particular the more skilled and capable resources—have to be deployed. Most objectives become much more difficult and costly to attain the more varied the output a factory is called upon to produce. Further costs are indirectly incurred if some economies in production are sacrificed (e.g. by producing all motors on a single line) in the interests of tighter control over production. Larger and simpler outputs offer greater opportunities for detailed and purposive control: it is easy to visualise a combination of low scale and great variety for which streamlined and sophisticated control procedures may yield no net advantage over a practice of muddling through somehow.

CONCLUDING COMMENTS

The Productivity of Direct and Overhead Labour

The comparison of direct labour productivity in article III made it clear that the three factories had adopted different approaches in working out their solutions to production problems. In this article we have examined the implications of the differing approaches for overheads, an examination which was essential to an understanding of productivities and costs in the factories as we found them in 1954. Time and again, things were done well because overhead resources and skills had been devoted to the job of getting them done well.

The production problem faced by these factories was a complicated one. F.H.P. motors were demanded for a wide variety of uses, and although production variety could be reduced through a standardisation of basic designs and components, a very considerable number of different motors was produced each week. Some of these motors were produced in ones and twos, some in hundreds, and some in thousands. Many, but not all, of the components required for motors produced in ones and twos were identical with those required for motors produced in thousands. One possible reaction to a complex mixture of small and large-scale production is to set up a complex manufacturing organisation: this was the reaction of C, and to some extent of D. In both factories, there were several motor assembly lines, and, usually, several lines for the production of the various components. In addition to this ' horizontal ' segregation by line there was also ' vertical ' segregation, in that stock-points were established so that components could be held until required for later stages of production. The potential advantages of segregation are obvious enough: firstly it ought to be possible to achieve faster work on lines confined to bulk outputs than on lines cluttered with a varied output; and secondly, it ought to be possible to introduce methods and techniques of production for bulk outputs which would be quite inappropriate to the production of a very varied output. The potential disadvantages are also obvious: with a complex manufacturing organisation, it becomes more difficult to plan and control production in such a way as to secure the most effective utilisation of men and machines.

The main differences between C and D were to be found in the ways in which they attempted to exploit the advantages and limit the disadvantages of a complicated manufacturing organisation. At C, resources of engineering and skilled toolroom labour were devoted to the improvement of methods and techniques, with the object of deriving advantages from segregation additional to those which could easily be obtained from the purchase of machinery and equipment suited to bulk production. At D, however, the pressure of day-to-day work on engineering and toolroom staffs was such that less technical development work could be successfully undertaken, and there was in consequence greater reliance on the easy economies from purchased machinery and equipment. Even greater contrasts were to be observed in the planning and control of production. C had evolved a complicated but effective office routine which more or less automatically ensured that materials and components were available when required, and that instructions to produce reached the floor in a form suitable to the exploitation of the technical possibilities of segregation. But the office departments did not attempt to control production in detail: the responsibility for a smooth flow of work devolved in the first instance on supervisors on the floor, and ultimately on the managerial personnel in charge of production on the floor. The flow of work was eased in many ways: machinery was in relatively abundant supply, and a relatively high level of inventory—both in official stock-points and in work-in-progress—was maintained. The individual piecework system of payment was helpful: it provided some incentive to maintain, and perhaps to increase, the rate of work; and it put supervisors under some pressure to ensure that individuals were able to earn their money. At D, work did not flow so smoothly, partly because the planning routine was less effective, partly because machinery was in rather tight supply, and partly because the system of payment to direct labour put pressure neither upon direct workers nor on supervisors. C's was a serious and relatively successful attempt to solve a complicated production problem productively: taking direct and overhead labour together, its productivity was well over 20 per cent higher than D's.[1] But it should be remembered that D had much the more varied output, and that it produced motors on a smaller scale. On such an output, a less ambitious approach may well be inevitable.

B also made a serious attempt to achieve high productivity on a complicated output. Its output of comparable motors was more varied than C's, and the scale of output lower: but it derived compensating advantages from its much larger factory scale. In complete contrast to C, it chose the simplest possible organisation of manufacture. All motors were produced on a single line, with a minimum differentiation of techniques. No attempt was made to plan production so that components could be produced in batches larger than was required for a week's output of finished motors, and in consequence intermediate stock-points were unnecessary. In effect, most of the advantages of segregation—which contributed so markedly to higher productivity at C—were deliberately neglected. Having simplified the organisation of production, B was able to concentrate its efforts on securing a fast flow of varied work down its line. The direct labour force was highly-trained, adaptable—and highly paid. Technical resources were devoted to a more detailed exploration of the potentialities of standardised methods and techniques than was possible at C where methods and techniques were more diverse; and a systematic attempt was made to control production in such a way that pressures for faster rates of work and better utilisation of machinery could successfully be applied. In many ways, B's solution was much more ambitious than C's; it could be described as representative of a higher level of industrial development, in which the selection of appropriate methods and techniques of production is merely the first step towards an effective exploitation of factors of production. A wider range of managerial skills was brought to bear on the problems of obtaining better performance, and in general a higher calibre of work was required both from direct and overhead labour. Despite the obvious limitations of B's organisation for producing the sort of output it was called upon to produce, the productivity of direct and overhead labour combined was higher—though not all that much higher—than at C.

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[1] See Table I. The difference in labour usage per motor produced was slightly smaller than 20 per cent: but C did work in the factory which D left to its suppliers.

The very different approaches of B and C emerge as alternative ways of achieving not very dissimilar productivity levels. Yet it seems likely that really high productivity would involve elements of both approaches; some combination of C's skill in applying those methods and techniques most suited to fast production, and B's skill in exploiting particular methods and techniques effectively. That, in practice, the approaches of B and C where alternatives can, in part at least, be attributed to the variety of output produced by both factories. No doubt a much higher productivity could have been achieved if the technical and control resources devoted to a single line at B could have been applied to each of C's lines. But this would have required an employment of overhead labour resources altogether greater than that found at either factory. If, given the scale of output produced by these factories, such an expansion of overheads could not be justified, some loss of productivity potential was inevitable. C lost from a dilution of technical effort and a weakening of control over the exploitation of its diverse methods and techniques, and B lost from a neglect of the possibilities for the fast production of bulk outputs. It was, for example, a quite remarkable achievement that on some operations direct labour using unmechanised techniques at B was not much less productive than direct labour using mechanised techniques at C. Yet it is evident that some wastage of resources is implied by such an achievement: there is no particular merit in pouring high-calibre resources into speeding a manual operation when a machine could do the job faster and cheaper. On a much simpler output, or possibly on a much larger output, C's skills and B's skills could be complementary. We do not mean to imply that there is some single approach which would necessarily be the most suitable for achieving a really high level of productivity on such outputs: the skills can be developed in various ways, and combined in various ways. But it is improbable that differences in approach as fundamental as those between B and C would be found at much higher productivity levels.

B's was the most ambitious—and, in terms of productivity, the most successful—solution,[1] yet it was more costly than C's: and indeed it was nearly as costly as D's,[2] despite the latter's substantially lower productivity. In the main, productivity advantages were eroded by higher labour payments. B paid its direct labour some 50 per cent more per week than D, and the differentials for overhead labour were only less large.[3] With differentials of this magnitude, the smaller factory with a more varied output could compete quite happily at a much lower level of productivity.

Given the priority which must be attached to the attainment of high levels of productivity, the results of the inter-factory comparisons may be considered rather depressing. On the one hand, the scale and composition of the outputs

[1] Labour productivity was somewhat higher at B than at C, and B's machinery productivity was probably substantially higher than C's.

[2] See Table I. The calculations there exclude direct materials costs, which were higher at B than at D.

[3] See Table II. Large differentials—35 per cent for direct labour—persist even when allowance is made for differences in the sex and skill composition of the labour forces.

produced were such that productivities were far below the levels which could have been attained, given the resources and skills employed, on less intractable outputs. On the other hand, relatively high productivity did not confer the marked competitive advantage which could—in principle—enable higher productivity factories to increase the scale of their output and be more selective about the output they were prepared to produce, and so make possible a transition to altogether higher levels of productivity. These are points which we shall discuss in the next section.

There is, however, considerable encouragement to be drawn from the inter-temporal comparisons. Over a difficult period of slump and recovery, each of these factories achieved an increase in direct labour productivity of at least 6–7 per cent per annum. Clearly none of the approaches had led to stagnation, and all were compatible with a fairly fast growth of productivity. The analysis of the sources of changes in productivity, and of productivity differences between factories, has been complicated partly because the sources were so numerous, and partly because the various changes and differences were related one to another in complex ways. The lesson to be drawn from the multiplicity of sources is that there is a wide range of opportunity for higher productivity. No matter how awkward the output to be produced, it can and should be produced more productively next year than this. The lesson to be drawn from the inter-relationships is that each approach had its own coherence and internal logic. In working towards higher productivity, a considerable measure of continuity in approach is both inevitable and desirable. Inevitable because management can never start afresh: come what may, next week's, next month's or next year's output will be produced in much the same way; and the personnel who take the decisions will be much the same. Desirable because the skill and experience which have accumulated in working out its solution to production problems—know-how in the broadest sense—are a factory's most valuable asset. Yet continuity in approach need not imply rigidity: the exploitation of the advantages of a particular approach need not preclude an evolution towards an approach which opens up new possibilities for higher productivity. Even during the brief two year period we studied, there were some signs of such evolution—in, for example, the reorganisation and expansion of technical staffs at D in an attempt to secure some of the technical advantages achieved by C, and in the introduction of a new line at C which attempted to secure some of the organisational and control advantages achieved by B. That these attempts were not quickly successful in raising productivity indicates the difficulty of absorbing unfamiliar elements; that the attempts were made indicates that the factories were prepared to experiment with ways and means of overcoming some of the limitations of their approaches. The increase in direct labour productivity is in many ways the best single indicator of managerial performance in fields which lie almost wholly within the competence of management, and the rate of increase recorded in these factories show that managements were alive to the considerable opportunities for improving their solutions to intransigent production problems.

A Note on Productivity and Competition

It has become the habit to look across the Atlantic for inspiration on productivity problems: and it happens that some information has been published which permits a rather impressionistic comparison between our factories and one American factory producing a similar product.[1] It would appear that direct labour productivity (output per man-hour) in the American factory in 1951 was of the order of twice that of the more productive factories in our study in 1954. We could not defend this estimate in any detail: more general comparisons between British and American manufacturing industries commonly suggest an even wider difference in output per man-hour.

Details are given for one motor only, but this gives some basis for a comparison of methods employed and of times taken for particular operations. With perhaps one or two exceptions, there are no mysteries about the methods or techniques employed; similar methods were used in, or known to, our factories. Their common characteristic was that they were fast methods and techniques, using machinery suited to bulk production. As would be expected, the methods and techniques were more similar to those used on the fast lines at C and D than to those used on B's single line. Differences in methods and techniques could not of themselves account for the productivity difference between the American factory and C, let alone D. The inference is that the American factory had been able to raise the rate of work on these methods and techniques far above the levels attained at C or D. Here again, the example of B in our studies indicates just how great are the potentialities for raising the rate of work on particular methods and techniques. We have already suggested that some combination of fast methods on the C pattern and fast work on the B pattern would permit altogether higher productivities than those achieved at either B or C; and it does seem that the American factory's very high productivity was based on such a combination. We also argued that the scale and variety of output produced in our factories was such as to make it difficult, and maybe expensive, for any of them to attempt a similar solution. The American factory was operating on a large scale: its factory scale was larger than B's, and its output of F.H.P. motors was larger than C's. But it is our impression that the major factor which made the solution of the American factory practicable was a lesser variety of output. For ¼ h.p. motors ' this company will accept orders for 500 or more custom motors, or 2,000 or more of the standard motors '.[2] On this size of motor, at any rate, there were no batches of ones and twos, and few batches of hundreds, to complicate the production problem.

The general report covering six American factories producing various sizes and types of F.H.P. motors makes it clear that small orders for special motors were actively discouraged. It is stated that ' all of the companies will accept small orders for motors of special design, but it is generally uneconomical for a purchaser to order specially designed motors . . . in lots of fewer than 200 because all design and tooling costs will be charged to the special order.'[1] In the process of manufacture, too, ' the production of the changed design is not permitted to disrupt the flow of operations '.[2] More specifically, in the factory producing ¼ h.p. motors: ' if the special design is a slight variation from the standard model, a bench is placed near the assembly line where one or two workers fabricate and install the special parts and return them to the production line. If a completely different kind of motor is scheduled, an entirely separate bench is set up and many hand operations are used '.[3] The emphasis on a fast flow of work is very reminiscent of B: but because the flow of work down B's line was so varied, it was considered necessary to use many ' hand ' operations for *all* motors.

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[1] *Case Study Data on Productivity and Factory Performance: Fractional Horsepower Motors: 1951.* Prepared for the Mutual Security Agency by the United States Department of Labour, May 1953.

[2] *Op. cit.*, p. 22.

There is clearly some relationship between productivity and the size and variety of output produced. It is not, of course, a unique relationship: any output can be produced more or less productively. But it is much easier to achieve a higher level of productivity on a larger and less varied output than on a smaller and more varied output. Quite apart from the evidence from an American factory, we know that productivity was lower at D, the factory with the smallest and most varied output; and that in each factory the more varied portion of output was produced less productively than the less varied portion. There are two sources of higher productivity on larger and simpler outputs. First, there are the gains stemming directly from the increase in scale and the reduction in variety: however the production problem is solved, productivity will be higher. Second, and much more important, a larger and simpler output will open up possibilities for more productive solutions, which are inhibited by the need to organise, plan and control production in such a way that a smaller and more varied output can be produced. It is therefore of some importance to consider why each of our factories produced outputs which were smaller, and more especially outputs which were much more varied, than that produced by the American factory. Since we made no direct study of pricing and selling practices, our comments will be speculative, and will not relate specifically to the three factories whose performance has been compared.

If higher productivity were associated with lower costs and lower prices, it would be expected that a relatively high productivity factory would be able to secure a larger share of the market. It could, if it wished, be more selective about the sort of orders it would accept: a larger scale and a simpler output would permit yet higher productivity and still lower costs. Small and special orders would be accepted only by the relatively low productivity factories which could not compete for bulk orders, and would become progressively more expensive relative to large or standard orders. A structure of industry in which some factories cater primarily for mass markets, and others cater primarily for the specialised demands of those who are still prepared to pay the price, is not unknown. It is one, at any rate, of the patterns which could emerge if there were a simple inverse relationship between productivity and prices within an industry. In practice, the relationship between productivity and prices will never be simple, and perhaps the most obvious complication is an overt and tacit limitation of price competition. A consideration of some of the possible consequences of such a limitation is given point by the fact that an overt Agreement on prices was in operation in this industry at the time of our study.

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[1] *Op. cit.*, p. 15.

[2] *Op. cit.*, p. 15.

[3] *Op. cit.*, p. 22.

As registered under the Restrictive Trade Practices Act, 1956, the Fractional Horsepower Motor Agreement 'comprised agreed prices, discounts and conditions of sale. The parties manufactured about 50 per cent of the U.K. production of small electric motors to which the agreement applied.'[1] This agreement was referred to the Restrictive Practices Court, but was abandoned before the case was heard. What is interesting about such an agreement is that it reflects views widely held in an industry concerning price competition, views which could long survive its abandonment. An insight into the views held by some firms in the electrical engineering industry is provided in the Report of the Monopolies and Restrictive Practices Commission on the Supply and Export of Electrical and Allied Machinery and Plant.[2] The Report does not cover F.H.P. motors, but there is a considerable overlap between the firms producing F.H.P. motors and the larger motors covered in the Report. There was, first, the view that 'price competition would have disastrous effects on the industry, on the buyers, and on the national economy'.[3] Second, there was the view that in the (agreed) pricing of particular products in a range of output, it was inevitable that there should be some balancing out of gains on some products and losses on others. 'In particular, the manufacturers say that there are bound to be exceptionally wide variations in the cost of small motors according to the range of requirements which the manufacturer caters for, and that in the absence of a common price system the prices of 'special' motors would be prohibitive'.[4] We are not concerned to attack or defend such views, nor do we know how widely or strongly they were held in relation to F.H.P. motor manufacture. The fact that an overt Agreement on prices survived until challenged under Restrictive Practices legislation, even though it covered only half the output of F.H.P. motors, suggests that *some* limitation of price competition had been effective. It may, therefore, be useful to suggest some of the ways in which such a limitation might have influenced developments within the industry.

To the extent that price competition for orders is limited, non-price forms of competition—in quality, services, and so on—will be more intense than they would otherwise be. To the extent that it is considered fair play to offer special motors at prices which are not prohibitive, it seems likely that an important element in that competition will be a willingness to adapt the product to meet the requirements of particular customers. The manufacturer gains the prestige deriving from a willingness to meet any ' reasonable ' requirements in his line of business. Furthermore, competitive pressures are somewhat weakened, in that the production of an adaptation for a customer makes it less likely that he will attempt to place repeat orders elsewhere. From the customer's point of view, it is a great convenience to have motors made to measure. If standard motors were very much cheaper than custom-built motors, there would be a substantial inducement to construct or adapt the equipment to be powered in such a way that a standard motor would serve. The smaller the differential, the more advantageous it will be for the customer to buy motors which ease his own design or production problems.

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[1] Registrar of Restrictive Trading Agreements, *Report for the period 7th August 1956 to 31st December 1959*, Cmnd. 1273.

[2] H.C.42 of 1957.

[3] *Op. cit.*, p. 247.

[4] *Op. cit.*, p. 257.

The combined effect of forms of competition which encourage the supply of variants, and of relative prices which do not actively discourage the demand for variants, will be that a greater variety of output will be produced than would otherwise be necessary. The variety of output to be produced will, as we have noted in many contexts, influence the way in which manufacture is organised, planned, and controlled: and productivity will inevitably be lower than could be achieved on a less varied output.

We know from our study of three factories that there are different ways of solving the problems of producing a varied output. But it is likely that all solutions were, to some extent, influenced by the pattern of relative prices. It will, for example, only make sense to offer ' specials ' at a price which is not prohibitive if they are produced at a cost which is not prohibitive. When many variants of a product are produced under the same roof, their relative costs will in part depend upon the way a mixed output is produced. Profit margins on ' specials ' as high as, or higher than, those on ' standards ' may mean no more than that a varied output has been produced in such a way that the additional costs of producing specials has been minimised. In general, the wider the variety of products which can profitably be produced given the pattern of relative prices, the wider will be the profitable opportunities for non-price competition for additional orders. Solutions to the production problem appropriate to one pattern of relative prices may be considered inappropriate to another very different pattern.[1] We do not wish to argue that relative prices determine relative costs, nor would it be sensible to assume that relative prices are rigid: even if there were general agreement on relative prices, there are bound to be changes as new products are introduced and as the balance of markets alters. What is more likely is that there is some process of interaction as a multi-product industry develops, in which relative costs influence relative prices and in which relative prices influence relative costs; and that the latter influence will be the more powerful the more effective the constraints on changes in relative prices.

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[1] It is to be supposed that a desire to expand sales by competing for orders over a wide range of variants of a product whose relative prices are given will be associated with attempts to solve the production problem in such a way that most variants will show a ' profit '. Depending on the solution adopted—and indeed on the costing practices followed—some variants will indeed show higher ' profits ' than others, and there will be opportunities for increasing total profits by *de facto* specialisation involving particularly vigorous attempts to expand sales of certain variants. A very different set of relative prices yielding the same revenue will of course yield the same total profits to those solutions. But, to the extent that more variants will be produced at a ' loss ', there will be a further reduction in the range of variants for which factories wish to compete for additional orders, and the solutions would probably be considered less appropriate to the competitive situation we are supposing.

A limitation of price competition could have more important effects on the *general* level of costs than on *relative* costs. Consider an increase in direct labour productivity which, if other things remain equal, would permit a general reduction in production costs. If the factory is unable or unwilling to reduce prices correspondingly, one of three things—or some combination of them—could happen. First, profit margins could widen. Second, the potential reduction in costs could be absorbed in attempts to increase sales. The products could be made more attractive, or reliable, or durable; salesmanship could be more persistent or vigorous. Third, the potential reduction in costs could be absorbed in production. For example, overhead labour staffs could be expanded or paid more; direct labour could be paid more. Such action should make it easier for the factory to secure further increases in direct labour productivity, and in turn make it possible to take further action to increase productivity. It is, indeed, possible to visualise a factory cumulatively increasing its productivity at much the same level of production costs: provided that other factories whose productivity is rising also refrain from price cuts, and are not more successful in attracting orders by additional ' sales ' expenditure, its competitive position will not be undermined.

In practice, a factory's freedom for manoeuvre may be more limited than we have implied. Under an incentive scheme of payment, for instance, some part of the potential reduction in cost from higher productivity will automatically be absorbed in higher labour payments. If it is successful, such a scheme will make further increases in productivity easier to achieve; and in any case it will ensure that part of the gains from higher productivity are taken out in higher pay. To the extent that some factories are more successful than others in increasing productivity, and more willing to pass on the gains to their own workers, pay differentials will emerge—as the huge differentials in labour payments found between B and D bear witness. In an indirect way, workers in a relatively high productivity factory may be the main beneficiaries of a limitation of price competition. The danger is, of course, that higher productivity could become as much an optional extra—almost a welfare service—as a competitive necessity. The lower productivity factory —provided it is able to match the sales expenditures which higher productivity factories think are worth making—can retain its markets.

Once again, we do not claim that cost levels are determined by price levels: in general one has to suppose that there will be some interaction between prices and costs, and the role of a limitation of price competition is merely to increase the importance of the influence of prices on costs. If too short-term a view is taken of the relationship between costs and prices, that part of the process in which costs can become adapted to prices may be overlooked.

It is one thing to speculate about the ways in which some limitation of price competition could have influenced an industry's development, and to see in that development certain features which could inhibit the attainment of really high levels of productivity on larger and simpler outputs. But it is quite another thing to suggest that a stiff dose of price competition would easily or quickly set matters to rights. First, the inducement for producers to secure larger and simpler outputs by price-cutting is limited. There were inordinately large fluctuations in the total output of the industry we studied, attributable in large measure to the impact of hire-purchase restrictions. The alternation of very strong and very weak market conditions for all producers is not a happy background to intensified price-competition. Furthermore, since it was the markets for the variants produced in largest quantities which proved most volatile, it is not difficult to understand a reluctance to concentrate exclusively on such risky and uncertain outputs. Second, the scope for price-cutting will be limited to the extent that the general level of costs, and relative costs, have become adjusted to particular levels of prices and to particular price relatives. In principle, it is true, new entrants could more easily take the lead. Third, if some prices are cut, the obvious reaction to cuts which threaten to erode markets you are accustomed and equipped to serve, is to retaliate by matching the cut. If any major redistribution of markets can be prevented in this way, the initial result will be that the more profitable producers earn lower profits, and the less profitable producers will not cover their total costs.[1] The less profitable producers who will be hit hardest are not necessarily the least productive producers, because there is no *necessary* association between relatively high profits and relatively high productivity. In our comparisons, the most productive factory was not the lowest cost producer. Eventually, of course, some producers will yield up some markets: but it would be unrealistic to suppose that they will not put up a struggle. In that struggle, it is at least conceivable that the rate of growth of productivity would be slowed down. Productivity increases, as we have stressed in the comparative studies, are very much dependent on the existence of a margin of overhead labour over and above that necessary for current production; and the temptation to reduce that margin in a period of severe pressure on profits will be strong. Fourthly, if output is redistributed in such a way that some factories produce larger and simpler outputs, the most important productivity gains have still to be worked for. Major re-organisations of production would be necessary to exploit the potential gains in productivity, and new skills would have to be learnt. And we have noted that major reorganisations are as likely to lower as to raise productivity in the short and even the medium run.

Up to a point, both stability and change can encourage the growth of productivity. A stability in the production problem to be solved permits concentrated efforts to solve it more productively: we have stressed the substantial gains which can be achieved by working on the details of an inevitably complex problem. On the other hand, change can provide opportunities for better solutions to different problems. But an excess of either will probably be harmful. An excess of stability will sooner or later result in resources being devoted to the more effective solution of the wrong problem, and an excess of change will result in too many of the resources which could have been devoted to an improvement in performance being devoted to a mere adaptation to change. One—but only one—aspect of the difficulties involved in attaining that judicious mixture of stability and change most favourable to productivity growth has been examined in this section.

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[1] Granted, of course, that the price cuts do not stimulate such a rapid expansion of demand that all producers can do so well as before or better. Such a high elasticity of demand is unlikely for products which are usually incorporated in more expensive equipment.

The comparison with an American factory led us to speculate on the possible explanation of the fact that each of the factories we studied produced an output on which it was far more difficult to achieve really high levels of productivity. It can be argued that a search for a particular sort of stability —a stability in prices—could have far-reaching effects both on the output that is produced, and on the way in which it is produced. Because the effects can be so pervasive, there is bound to be a built-in resistance to certain sorts of change. It would be simple-minded to think of competition as a free-for-all in which no holds are barred, particularly in an industry where certain forms of competitive behaviour can so easily exaggerate short-term instability. If certain limitations on competitive behaviour are implicitly or explicitly accepted, an industry will adapt itself to those limitations. It is true that with a different set of limitations an industry will evolve in a different way: but if the rules of a game change at half-time, play in the second half is liable to be messy and unrewarding—at least for the players.

LIQUIDITY AND THE ATTACK ON QUANTITY THEORY

By M. J. Artis

Although the Radcliffe Report[1] was well received on all sides for its description of the financial institutions of the U.K., its analysis of the theory and practice of monetary policy has been greeted with something less than enthusiasm by academic economists.

The specific complaint has been that the Report's attack on ' quantity theory ' approaches to monetary policy was not complemented by a positive attempt to construct a new (and comprehensible) alternative. It is certainly true that the committee's effort to construct a new theoretical approach is characterized as much by woolliness as by novelty, that not even the central concept in this new approach—' the whole liquidity position '—is clearly defined, and that the new insights promised by the concept are not worked out in clear detail. In the circumstances it is not surprising that among economists the result has been confusion and dissension, hostility and misunderstanding: as one witness reminded the committee,[2] academic economists ' all quarrel amongst themselves so that one does not know what to believe '.

Now that the dust has begun to settle it should be possible to discern more clearly what the committee thought they were saying, and to assess some of the implications of their analysis; this task is the easier, now that we can benefit from the ex-post rationalizations of the two academic economists on the committee,[3] as well as from the numerous contributions by other experts. Accordingly, this article aims to examine some of the arguments used by the committee in its rejection of what might be called ' quantity theory policies ', and to assess, in the light of these arguments, what it meant by ' liquidity ', and what insights into the modus operandi of monetary policy are suggested by this concept. In addition, statistical material has been used to illustrate and test some of the committee's conclusions on crucial issues.

Naive Quantity Theory

Lamentably enough, the committee had to deal first with the crudest and most simple form of quantity theory, such as enjoyed a resurgence of favour under the chancellorship of Mr. Thorneycroft. On this view increases in money supply and price levels are ' magically ' linked together (*i.e.* in terms of the Fisher equation of exchange $MV=PT$, T and V are to be treated as constants). The committee was in no doubt that variations in money supply

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[1] *Report of the Committee on the Working of the Monetary System*, Cmnd. 827. (It may be noted that where particular paragraphs of the *Report* are referred to in this article the number of the paragraph is indicated in brackets.)

[2] *Min. of Evidence*, Qn. 13235. The witness was Mr. Tuke.

[3] Prof. Sayers' address to the British Association, ' Monetary Thought and Monetary Policy in England ', reprinted in *The Banker* (Oct. 1960) and *Economic Journal* (1960). Professor Cairncross, ' Monetary Policy in a Mixed Economy ', *Wicksell Lectures* (1960).

TABLE 1

Year and Quarter		(1) Real GDP (Seasonally adj.) £m.	(2) Total Money Supply (Seasonally adj.) £m.	(3) Excess money Supply increase (Qr. to Qr.) %	(4) Price Increases (Qr. to Qr.) (%)
1956	I	4,081	7897.0	...	...
	II	4,089	7882.8	−0.376	0.7
	III	4,085	7919.3	0.561	0.40
	IV	4,100	7940.2	−0.103	2.57
1957	I	4,177	7964 3	−1.574	−0.19
	II	4,201	8030,7	0.259	0.48
	III	4,209	8135.9	1.120	2.60
	IV	4,181	8135.9	−0.665	1.12
1958	I	4,193	8200.7	0.509	2.32
	II	4,177	8261.7	1.126	0.72
	III	4,177	8311.3	0.600	−1.08
	IV	4,237	8383.2	−0.571	1.82
1959	I	4,259	8480.5	0.642	1.53
	II	4,358	8573.0	−1.233	−0.53
	III	4,437	8692.7	−0.417	−0.98
	IV	4,551	8860.7	−0.636	0.18
1960	I	4,606	8945.6	−0.251	0.72
	II	4,646	8981.0	−0.472	1.52
	III	4,638	8938.2	−0.305	−0.18

Sources: London and Cambridge Economic Bulletin. National Institute Economic Review, Economic Trends, Statistical Appendix to the Memorandum of Evidence to the Committee on the Working of the Monetary System (*Vol. 2*), and the *Quarterly Bulletin of the Bank of England.*

Column:

1. Derived from the *London and Cambridge Economic Bulletin* and *N.I.E.S.R. Economic Review.*
2. Money supply is defined as total net deposits with London Clearing Banks, and Scottish Banks plus cash in circulation, seasonally adjusted by the method of moving averages.
3. Excess money supply increase is defined as the excess of quarterly increase in money supply (col .(2)) over the increase in real G.D.P. (col. 1).
4. Quarterly price increases derived from the deflation used in calculating constant price G.D.P. from current price G.D.P. estimates as they appear in *Economic Trends.*

could be offset, in their effect on price levels, by variations in the velocity of circulation, adding moreover, that 'we . . . cannot find any reason for supposing . . . that there is any limit to the velocity of circulation' (391). Although the committee mentioned that it was statistically possible to demonstrate that rises in velocity during the past few years had financed a continuous expansion in expenditure, they did not in fact produce any such demonstration.

A. E. Holmans has subsequently tested the relationships between money supply, expenditure and price levels, using annual data for 12 countries, concluding that a close connection between changes in money supply, expenditure and price levels had yet to be proven.[1] A similar test of 'naive' quantity theory using quarterly data for the U.K. has been made here, from which the conclusion is once again, 'unproven'. Table 1 sets out the figures, the sources and definitions of which are set out at the bottom of the table.

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[1] In an article 'The Quantity of Money, Gross National Product and the Price Level', in *The Scottish Journal of Political Economy* (Feb 1961).

The correlation co-efficient between excess money supply increase and price levels (unlagged) is only 0.35; when prices are lagged 1 quarter on money, the co-efficient reduces to 0.1, and with a lag of two quarters 0.09.[1] These calculations confirm that the committee was correct in condemning outright the crude form of quantity theory. The committee's views on more sophisticated forms of quantity theory are dealt with later.

The Whole Liquidity Position

The committee did not conclude, from its rejection of naive quantity theory as a suitable approach to the theory and practice of monetary policy, that it should examine the determinants of velocity, arguing that velocity ' is a statistical concept which tells us nothing directly of the motivation that influences the level of demand.' (391) This is a reasonable conclusion from the fact that in practice velocity has to be deduced by deflating PT of the Fisher equation by M, both terms being arbitrarily defined; V is nothing but a residual. (Per contra, an independent definition and calculation of V devalues M or PT to the status of residual).

At this point then, the committee introduced the concept of ' liquidity ', analysis of which, it promised, would ' direct attention to the behaviour and decisions that do directly influence the level of demand '.

It is not easy to assure oneself that the promises made of the concept of liquidity are fulfilled. Indeed, there is no precise definition of this concept anywhere in the Report, and to some economists this in itself has seemed too ungracious a gesture to be ignored.[2] It does not, however, follow that because the Report offers no precise definition of ' the whole liquidity position ' that it is suggesting something quite meaningless or suggesting nothing at all. Nor does the fact that the concept is used to mean apparently different things in different occasions rule out the possibility that these ' different things ' are actually different aspects of the same thing. New concepts, moreover, characteristically involve—if they are fruitful concepts—new ways of looking at problems, and thus may appear to resist definition in terms of the old familiar concepts. It has, at any rate, now been recognised that the term ' liquidity ' cannot be ruled out if it refers to both stock and flow aspects,[3] or because it may refer to both a quantity and a quality.[4]

In distilling the meaning of the ' whole liquidity position ', the aim must be to see what is involved in ' looking at the whole liquidity position ', and this should be borne in mind in the following section, where an attempt has been made to arrive at a view of what ' liquidity ' means, by matching the various interpretations offered against the uses of the concept in the Report itself.

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[1] The correlations obtained by using seasonally *un*adjusted data are even lower.

[2] Thus Sir Roy Harrod, reviewing the Report in the *Westminster Bank Review* for Nov. 1959: ' One would expect it (the Report) to offer a definition of great precision.' Harrod's own definition of the concept is dealt with later in the article.

[3] Gaskin, ' Liquidity and the Monetary Mechanism,' *O.E.P.* (Oct. 1960).

[4] Jasay, in a generally unsympathetic review, ' The Working of the Radcliffe Monetary System ', *O.E.P.* (June 1960).

In his early review of the Report,[1] Harrod suggested a definition of the concept of liquidity, which is based on Keynes' use of the term ' amount of liquidity available ', by which he evidently meant something synonymous, or virtually so, with the supply of money.[2] The only concession to novelty that Harrod is prepared to make, is to consider the possibility of including unused overdraft limits along with the quantity of money, to supply the reason for using a new label for an old concept. Even this concession is qualified as worthless, as Harrod assumes that overdraft limits move with the supply of money; and for the same reason no other financial asset will qualify for inclusion,[3] so that, in Harrod's hands, the ' new ' concept of liquidity turns out to be no advance on the old concept of money supply, as ' the foundation stone of British monetary theory '.

If this is the definition of liquidity, then it clearly follows, as Harrod says, that the Report's ' belittling references to the significance of the quantity of money must be wrong '; it is certainly clear that the committee thought they meant something different from the supply of money by talking about liquidity, although the two are not separate. For instance, in para. 478 where the committee set out to discuss the prospective liquidity position of the economy in the 1960s, they begin by observing the fall in the supply of money relative to GNP, interpreting this as an augury of decreased liquidity. But even here the committee are regarding the supply of money only as a prominent constituent of liquidity, for they move on to discuss the size and growth of deposits with banks and financial institutions outside the London Clearing Banks.

Harrod would presumably deny that these institutions constitute a source of liquidity to anyone, and argue that they are only channels of lending; but this view ignores the liabilities of the institutions in question. The fact is that money deposited in a financial intermediary is nearly as good as cash to many individuals and firms, and such deposits therefore can be held for much the same reasons as cash is held; accordingly, the need to hold actual cash balances at a given level is much reduced—it is possible to ' get by ' on a smaller quantity of money.

The second view of liquidity which has to be discussed also involves the assumption—as does Harrod's view—that liquidity is a quantifiable concept, that one might speak, in one and the same breath, of ' the amount of liquidity available ' and ' the whole liquidity position '. Some support, indeed, can be marshalled from sections of the Report in favour of the notion that liquidity is measurable; in this case, ' liquidity ' will differ from the supply of money by the amount of other financial assets included in the aggregation. The argument that the current controversy over liquidity and the supply of money is strictly analogous with the Banking and Currency School controversies[1] of the last century is perhaps suggestive of such an interpretation. In addition, paras. 389, 393, 507 and 981 of the Report might be read as suggesting that liquidity should be construed as a quantitative concept. Again, Table 22 of the Report and the accompanying text (esp. para. 478) would reinforce this view, were it not for the fact that the Report explicitly states (478) that there is no way of aggregating the deposits held in different kinds of financial institutions in such a manner as to take account of the varying degree of liquidity of these deposits. Moreover, not only does the degree of liquidity vary between various kinds of deposit; it also varies through time.[2] Nevertheless, it is clearly implied that a study of such figures as are presented in Table 22[3] of the Report constitutes part of what is meant by looking at the whole liquidity position.

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[1] *Westminster Bank Review* (Nov. 1959).

[2] As Prof. Sayers has subsequently pointed out in his article in *The Banker* (Oct. 1960), ' Keynes was thoroughly traditional in drawing a sharp line between money and other assets.' For this reason he characterises the Radcliffe Committee's views as ' a departure from Keynesianism.'

[3] Prof. Cairncross in his contribution (Monetary Policy in a Mixed Economy) (*Wicksell Lectures* 1960), p. 14, specifically denies that liquid deposits with non-bank institutions must move in the same direction as bank deposits. Unfortunately U.K. statistics are not comprehensive enough to give full empirical support to this statement, but some main series are shown in Table 3.

Although the use of the concept in the Report clearly resists it, this interpretation has undoubtedly gained a following among economists and some of its implications will be examined below. It is noteworthy that the proponents of this view do not agree with Harrod that the quantity of liquidity is no more important than the quantity of money, or that the growth of non-bank intermediaries makes *no* difference to the effectiveness of orthodox monetary policies. Even the most orthodox theorising in this line would not deny that the creation of near-money (one of the products of financial intermediaries) makes a difference. Thus Gurley and Shaw, in their book '*Money in a Theory of Finance*', whilst assuming that the banking system is the sole administrator of the payments mechanism (which allows them to theorize with a fixed definition of money), argue that non-bank financial intermediaries, 'may reduce the effectiveness of monetary policy in that a given change in nominal money has less effect on the interest rate and on the price level than it otherwise would have'. Notwithstanding which, on their analysis, the desired aims of monetary policy (control over prices and interest rates) can still be achieved by using orthodox monetary policy (controlling the supply of money)—but only by using this kind of policy with much greater severity.

To avoid such a conclusion it would not be illogical to advocate 'liquidity controls' over the non-bank sector, in order to make monetary policy effective with a minimum risk of inducing panic. The Radcliffe Report rejected this idea as impracticable (394) 'not mainly because of its administrative burdens, but because the further growth of new financial institutions would allow the situation continually to slip from under the grip of the authorities.'

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[1] This analogy has been suggested by A. B. Cramp, 'Radcliffe's Victorian Forebears' (Sept 1960) and Sayers, 'Monetary Thought and Monetary Policy in England' (*loc. cit.*)

[2] *e.g.* (478) 'building society shares, for instance, are certainly regarded as more liquid than they used to be.'

[3] This table (p. 171 of the Report) shows net personal deposits with the London Clearing Banks, Building Societies, Post Office and Trustee Savings Banks under the heading 'Liquid Assets of the Personal Sector'.

Paish, in an early statement of views[1] on the Report, expressed the quantitative view of liquidity succintly, when he said that ' an increase in non-monetary liquidity therefore has the same effect as an increase in the quantity of money, since the money set free by the increase in non-monetary liquidity is available for additional expenditure on assets '. The mechanism by which this works is presumably like that described above in discussing Harrod's interpretation.

One of the objections to this kind of (quantitative) definition of liquidity has already been mentioned—the liquidity of assets varies both relatively and through time in such a way as to defy quantification. But the committee could be expected, in any case, to reject a quantitative definition of liquidity for precisely one of the reasons for which it rejects quantity theory (by the implication of its derogatory remarks)—namely, that it would be no easier to define the limits of liquidity than to define money; this argument, if acceptable, need not deny that changes in the stock of near-money can—on certain assumptions—act like changes in the supply of money. But it is evident that something more is meant.

For its views on the quantity theory of money the Committee lent heavily on the evidence submitted to it by R. F. Kahn,[2] on the basis of which it was led to dismiss, as invalid, monetary policies of which the centrepiece of action was held to be the quantity of money. Kahn pointed out that the physical limitation of the supply of money could not in itself affect spending or prices; any such effects will flow from the level of interest rates. Demands for money to spend will be affected by interest rates, and the consequent movement in velocity will therefore be a consequence of this process. Changes in money supply, as well as changes in other factors, are necessary to achieve a given desired level and structure of interest rates. Some experts have considered that the Report garbled Kahn's evidence, but part (*g*) of para. 397 seems quite a fair representation: ' The Authorities thus have to regard the structure of interest rates rather than the supply of money as the centre-piece of the monetary mechanism. This does not mean that the supply of money is unimportant, but that its control is incidental to interest rate policy '. The quantitative view of liquidity can uphold the committee's position in devaluing monetary policies which take the supply of money as the centrepiece of action. For the quantitative view recognises that the existence of a stock of near money will loosen the connexion between variations in money supply, interest rates and price levels. But this is not the whole basis for the committee's shift of emphasis from the supply of money to the level and structure of interest rates, for factors other than the existence of a stock of near-money intervene to distort the connection between money supply and interest rates[1]; moreover the problem of drawing a line between the liquid and the non-liquid is insoluble.

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[1] ' What *is* this liquidity? ' *Banker* (Oct. 1959).

[2] *Memo. of Evidence*, Vol. 3, pp. 138–146 and *Min. of Evidence* Qn. 10938–11024.

Thus neither of the foregoing interpretations of liquidity meets the requirements of consistency with the use of the concept in the Report, or of providing insights into the monetary mechanism which cannot be manufactured from existing orthodoxy. Further interpretations have been offered, suggesting that liquidity is a qualitative concept—(803) ' the liquidity is greater the closer the assets approximate to money '. As we have shown that the committee do not regard liquidity as an independent attribute unchanged through time and comparable between assets as a quality, we must ask, what does it depend on? At the farthest extreme, liquidity may appear to be as great as people desire, since ' it is the whole liquidity position that is relevant to spending decisions ' (389) and spending ' is related to the amount of money people think they can get hold of '. More concretely, the amount of money people think they can get hold of will depend on the size and composition of their assets, their borrowing power, their expectations of future income flows and the ' methods, moods and resources of financial institutions and other firms which are prepared (on terms) to finance other people's spending.' (389). The market position of a borrower thus influences his liquidity, as does the market structure of the financial sector, which influences the terms on which money can be raised.

Impressed by the ease with which would-be borrowers, frustrated in their attempts to obtain bank accommodation, found finance elsewhere, the Committee described all financial institutions as ' competing in a single market for credit ' (981). It did, however, qualify this statement (' there are at some points structural faults in that market ') and in its suggestion of using the ' liquidity ' (or locking-in) effect of a rise in the rate of interest, certainly relies in part on the exploitation of institutional rigidities, and market imperfections. The liquidity of would-be spenders thus depends on an institutional framework which confers liquidity on assets in various ways.

What is more, in the not-so-long run, this institutional framework shows itself to be extremely flexible in meeting liquidity requirements. The response to pressures of demand—and pressures of directional monetary controls—is the creation of new institutions and the formation of wide markets in formerly illiquid assets. Whether or not it is true that such innovations would take place so quickly as to make administrative controls over the non-bank sector permanently obsolescent is not clear, but it is certainly obvious that the committee regarded the pressure of demand as responsible for its own satisfaction, eventually, through processes of innovation.

It should also be obvious that the distribution of financial assets and other sources of liquidity is as important as the total stock. The accumulation of undistributed profits in the hands of Mrs. Robinson's[1] 'sleepy monopolies' will have different consequences for monetary policy than if the same quantity of assets were to be held by fast growing firms—notwithstanding the powerful redistribution function exercised by an efficient financial system (480, 481).

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[1] Nor does the committee, as we have seen, seek to suggest that the paramountcy of quantity theory policies can be restored by the eradication of the influence of near-money substitutes, either through imposing ' liquidity controls ' over the entire financial sector, or by indulging quantity theory policies more severely.

It should now be possible to see more clearly what 'looking at the whole liquidity position' entails. It certainly involves looking at the supply of money in relation to the size of the national income (388, 389, 478), and at total deposits held in a range of institutions outside the London Clearing Banks (478). The amount of trade credit in existence, the quantity and distribution of undistributed profits and the company holdings of tax reserve certificates are also important (479, 480), as is their distribution among fast and slow growers (481). In addition, some assessment of the potential for further innovation in the financial sector (or of developments in industry with similar consequences) is called for: although the Report tends to suggest that the forces of innovation in this field are inexorable, it could hardly hold that there are no limitations in the short run, or that such limitations cannot be manufactured (*e.g.* by a ban on capital issues by financial intermediaries, etc.).

In view of what has been said it should be clear that there are strong limitations to the interpretation of 'liquidity' as a (definable) stock of liquid assets, exercising a predictable effect on quantity theory policies as a stock of money-substitutes, although this is no doubt part of the import of the introduction of the concept.

The Attack on Sophisticated Quantity Theory

The attack on naive quantity theory, which simply involves an assault on the assumption that the velocity of circulation is a constant, can of course be accepted by those quantity theorists who hold a more sophisticated position. Friedman[2] holds that the sophisticated quantity theorist can be distinguished by his beliefs on three issues—the stability of the demand function for money, the independence of factors affecting the supply of, and the demand for money, and the form of the function itself. A frequent reaction to the attack on naive quantity theory is to claim that a rise in velocity is not a neutral offset to a fall in money supply, as—other things being equal—this rise in velocity will take place in the context of higher interest rates. One of the proponents of this view—L. S. Ritter[3]—even goes so far as to claim that the accommodating response of velocity to variations in money supply is a positive benefit, since this kind of policy can thus be used 'without continuous fear that a sudden financial crisis will occur'. At the same time he maintains that monetary policy *is* effective in controlling inflation, though a gradual moderation of inflationary pressures requires a sharp change in monetary policy.

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[1] See Joan Robinson's article 'General Liquidity' in the *Banker* (Dec. 1960). There is no straightforward recognition of this point in the Report.

[2] 'The Quantity Theory of Money—a Restatement' in '*Studies in the Quantity Theory of Money*' (Ed. Friedman).

[3] In an article entitled 'Income Velocity and anti-inflationary monetary policy' *American Economic Review* (March 1959).

In the Keynesian tradition it has been usual to maintain that the demand function for money is of a peculiar shape (the liquidity trap thesis) and that it is, in any case, not particularly stable. The ' longer ' the interest rate under consideration, the less useful will a simple form of demand function be; and most unpredictable of all, is the influence of expectations.

The Radcliffe Report, whilst basing a part of its theory of interest rate determination on questions of expectations, and being particularly anxious that a suitable *structure* of interest rates should be the aim of the authorities, added a new weapon to the armoury of anti-quantity theory conceptual equipment. As this form of attack has a good deal to do with the ' whole liquidity position ' it seems important to examine and test it.

It has already been shown that the concept of liquidity is nowhere firmly nailed down in the Report; even less adequately dealt with is the process by which ' liquidity ' affects the monetary system. The most obvious exception to this generalisation occurs in para. 392, where the impact of financial intermediaries on the relationship between velocity and interest rates is outlined. This paragraph has been hailed as an ' admirable account of the determination of the level of interest rates ', by one prominent critic, John Gurley, in his very valuable and exhaustive review in the *American Economic Review* for Sept. 1960. Substantially similar explanations of the working of a Radcliffe monetary system have been put forward by Gaskin (*O.E.P.*, Oct. 1960) and H. B. Rose (*Banker*, March 1960), among others. It should not be surprising that Gurley finds para. 392 ' an admirable account ', for it bears a close resemblance to the statement of the impact of financial intermediaries on monetary policy by Gurley and Shaw.[1] The conclusion of their analysis is the advocacy of heavier doses of traditional monetary policy; the same could presumably follow for the Radcliffe Committee's analysis, were it not for the fact (deplored by Gurley) that they go out of their way to raise other factors of crucial importance in the determination of the interest rate, elsewhere in the Report.[2] Nonetheless para. 392 has been widely held to be the content of the Radcliffe Report's ' theory '.

It will be worth stating the relevant part of the para 392 in full; it reads: ' If there is less money to go round in relation to other assets (both physical and financial) it will be held only by people willing to make a greater sacrifice in order to hold it: that is to say, rates of interest will rise. But they will not, unaided, rise by much because in a highly developed financial system . . . there are many highly liquid assets which are close substitutes for money, as good to hold and only inferior when the actual moment for a payment arrives.' A footnote states the position even more clearly: ' *i.e.* the more efficient the financial structure the more can the velocity of circulation be streched without serious inconvenience being caused.'

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[1] In their book ' *Money in a Theory of Finance* '.

[2] In addition, as will be suggested at a later stage, the committee may hold a certain view on the creation of near money which would make the pursuance of quantity theory policies in ' heavier doses ' a non-sequitur.

It had formerly been assumed[1] that the velocity of circulation is an increasing function of the short term rate of interest; that given increases in velocity require larger and larger increases in the interest rate. Testing this hypothesis with pre-war data, Kalecki obtained encouraging results.[2] The Radcliffe Report seems to be suggesting that under post-war conditions such a reliable relationship will not be found to hold.

The thesis advanced in para. 392 is not dissimilar to an idea put forward by Minsky,[3] and subsequently tested with U.S. data by S. W. Rousseas[4] and Bernstein.[5] The basis of Minsky's thesis was that the process of innovation in financial institutions would result in a continuous rightward shift in the velocity-interest schedule, since financial innovation means precisely the devising of ways and means of supporting the same turnover on smaller cash balances, and minimizing the inconvenience in doing so.

The diagram below summarizes this proposition; each k curve represents a Kalecki-type velocity-interest schedule; through time the schedule shifts to the right, so that the observed schedule is much flatter than the individual k-curves. All kinds of innovation in institutions can have the required effect —industrial integration, the creation of new institutions whose liabilities are considered to be nearly as good as money, the widening of formerly narrow markets, so that the price of an asset liquidated on those markets becomes more predictable, and so on.

An appropriate analogy as far as the statistical methodology is concerned, is with the analysis of statistical demand curves: data collected over time will not provide a suitable basis for drawing up ' the ' demand curve, since the ceteris paribus conditions are almost certainly violated. An important source of disturbance to these conditions will, of course, be the relative availability of substitutes. What Minsky has suggested is that the provision of money-substitutes is systematically connected with movements along the velocity-interest schedule, since high interest régimes give the incentive to innovate in constructing new financial institutions and creating new financial arrangements; in other words, the shift of the curve is not an autonomous, quasi-accidental, or once-for-all occurrence, but a consequence of the fact that high interest rates themselves destroy the ceteris paribus assumptions, by increasing the incentive to innovate.

In the articles mentioned above, Rousseas and Bernstein, working with American data, certainly demonstrate that over a comparatively short period

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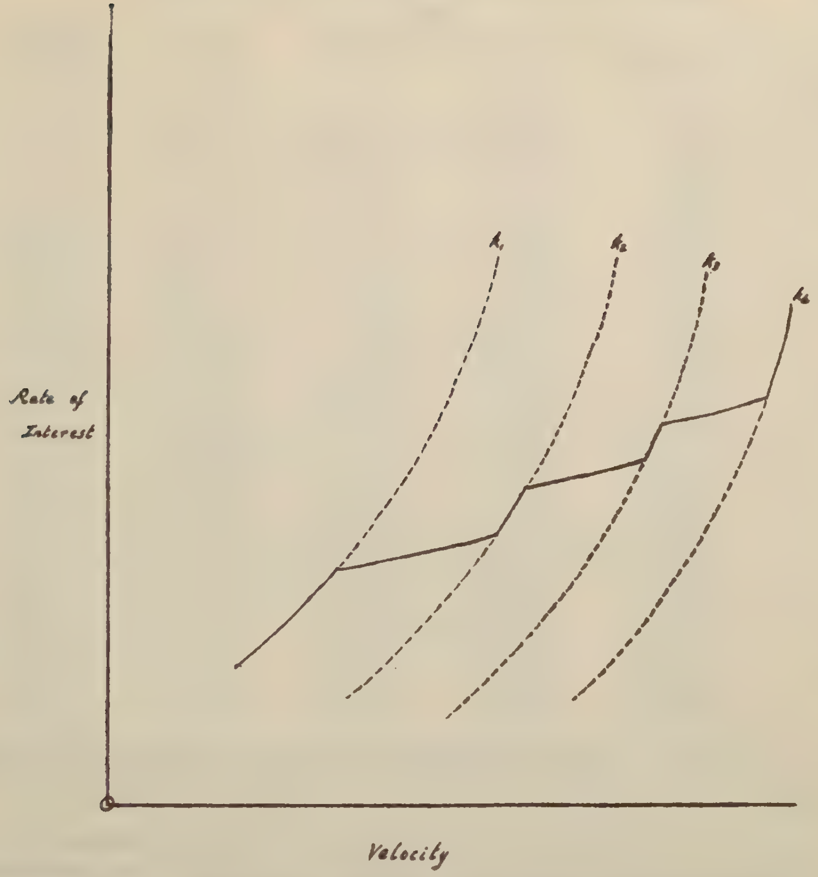
[1] For instance, by Kalecki, *The Theory of Economic Dynamics*, pp. 73–9.

[2] *Op. cit.*, p. 77.

[3] In his article ' Central Banking and Money Market Changes ', *Quarterly Journal of Economics* (May 1957).

[4] ' Velocity change and the effectiveness of monetary policy ' and 'A Rejoinder ', in the *Review of Economics and Statistics* (Feb. 1960 and Nov. 1960).

[5] ' The response of income velocity to interest rate changes: a comment,' in the *Review of Economics and Statistics* (Nov. 1960).



of time (1951–9), higher velocities come to be associated with a given level of the interest rate. The precise explanation for this, and its consequences for monetary policy are not so obvious: if the potentialities for further innovation in financial arrangements could be shown to have been exhausted, then one might view the rightward ' shift ' with equanimity, and begin to talk of the existence of an asymptote to velocity. Such an assumption, however, does not seem to be warranted, at least not if the Radcliffe Report's evident respect for the flexibility of the financial system is justified.

The analysis of velocity and interest rates undertaken here with U.K. data from 1954 to the third quarter of 1960 raises similar questions. It is certainly true, once again, that during this period the velocity associated with a given interest rate rises substantially. It is tempting to interpret this as the resultant of a shift (or series of shifts) in the velocity-interest relationship of which an important cause could well be the growth of financial intermediaries—especially as the most obvious ' shift ' from the statistical point of view coincides with what one could plausibly expect on economic grounds. Other interpretations readily present themselves, however: a change in any other

TABLE 2

Year and Quarter		*Money Supply (unadjusted)* £m	*G.D.P. (current prices)* £m	*Income Velocity* (v)	*Treasury Bill rate* (r')	*Short Bond Rate* (r'')
1954	I	7815.3	3,712	0.475	2.096	2.91
	II	7915.8	3,848	0.486	1.848	2.59
	III	8104.8	4,068	0.502	1.599	2.22
	IV	8239.1	4,043	0.491	1.666	2.29
1955	I	8073.4	3,985	0.494	2.909	2.66
	II	7968.1	4,132	0.519	3.890	3.66
	III	8056.6	4,205	0.522	4.017	4.43
	IV	8014.9	4,440	0.554	4.086	4.47
1956	I	7839.4	4,271	0.545	4.685	4.74
	II	7759.0	4,579	0.590	5.041	4.60
	III	7958.9	4,510	0.567	5.047	4.54
	IV	8083.1	4,763	0.589	4.996	4.83
1957	I	7906.2	4,590	0.581	4.337	4.84
	II	7904.6	4,782	0.605	3.906	4.82
	III	8176.6	4,775	0.584	4.415	4.98
	IV	8282.3	5,035	0.608	6.527	6.04
1958	I	8140.8	4,811	0.591	6.042	5.38
	II	8132.0	4,947	0.608	4.921	4.69
	III	8352.9	4,994	0.598	3.857	4.51
	IV	8534.1	5,230	0.613	3.445	4.32
1959	I	8418.6	4,793	0.569	3.174	4.11
	II	8438.4	5,191	0.615	3.345	4.10
	III	8736.2	5,159	0.591	3.474	4.22
	IV	9020.2	5,489	0.609	3.479	4.23
1960	I	8880.3	5,233	0.589	4.376	4.78
	II	8840.0	5,568	0.630	5.707	5.29
	III	8982.9	5,435	0.605	5.564	6.10

Sources: Economic Trends. Monthly Digest of Statistics, the Economist, and Statistical Appendix to the Memorandum of Evidence to the Committee on the Working of the Monetary System, Vol. 2.

parameter of the velocity-interest relationship could induce a similar shift, or alteration in the shape of the curve—changes in expectations, the distribution of wealth, information, taxation rates, and the rest[1]—everything which could substantially affect the ceteris paribus conditions. There is no reason why the curve should not shift in the other (leftward) direction or alter in shape from one position to another. Whilst the ' shift ' hypothesis seems plausible on a priori and (as will be shown) on empirical grounds too, it would be foolish to lose sight of the fact that autonomous changes in the ceteris paribus conditions will yield important deviations from any assumed relationship. It is clear, for instance, that some of the observations recorded in the succeeding section have been substantially affected by the influence of ' package deal ' measures on confidence and expectations.

The raw data of the analysis are presented in Table 2, and Graphs I and II show the association of velocity with the short bond rate (Graph I) and with the treasury bill rate (Graph II). Graphs III and IV plot the same data in the form of a time series. The figures have been drawn up from 1954 when

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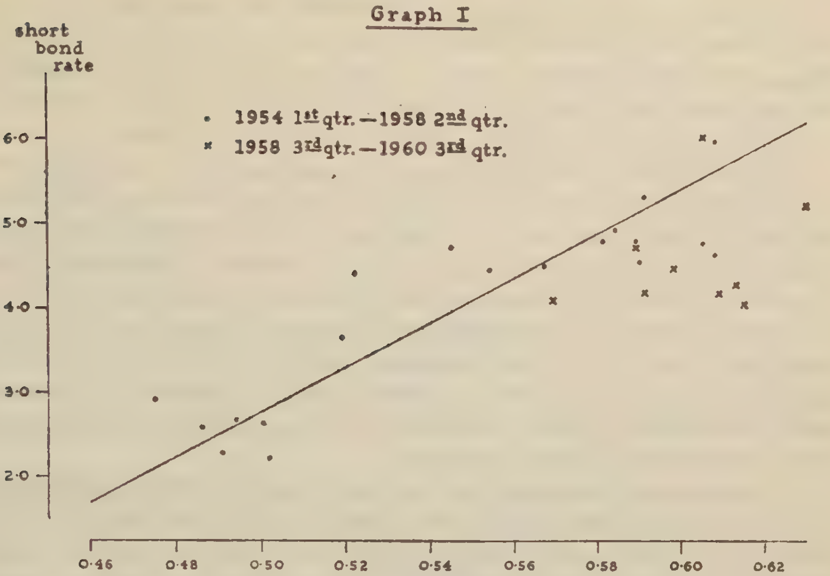
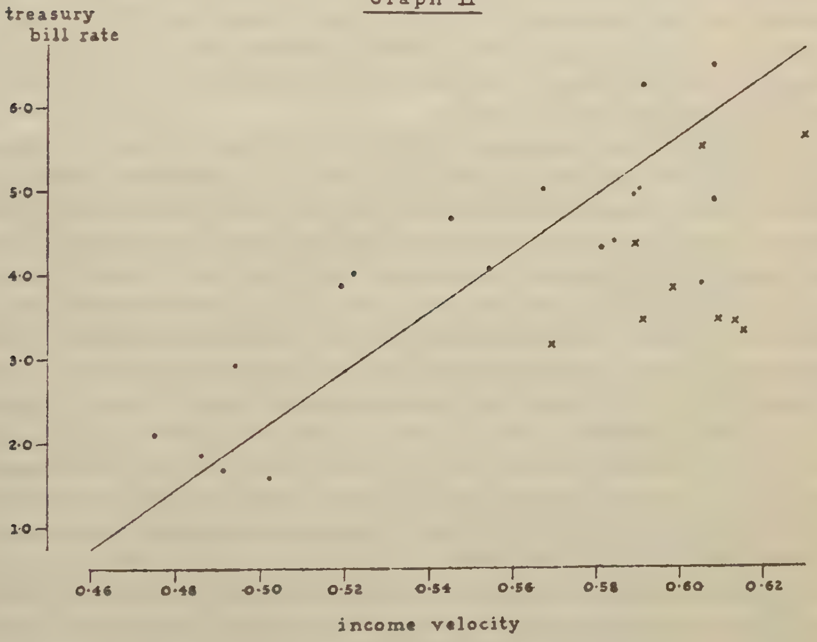
[1] Including of course the increased exploitation of existing financial arrangements and institutions, such as would occur, for instance, after the removal of restrictions on bank advances.

Graph I



Graph II



monetary policy was seriously re-activated to deal with inflation, and continue on a quarterly basis, until the third quarter of 1960. The first column shows the supply of money (defined in the same way as for Table 1); the second shows figures of unadjusted current price estimates of G.D.P.; for the quarterly analysis, which was adopted to give a large enough number of observations, only G.D.P. figures are available, not those for G.N.P.[1] The third column then gives the income velocity derived by dividing the G.D.P. figure by the money supply figure; in the fourth column is the treasury bill rate, calculated as the weighted average of the weekly rates at the tender, and in the fifth, the short bond rate as shown in the *Monthly Digest*.

The use of the treasury bill rate as an indicator of ' the short rate ' is subject to the difficulties associated with the fact that the discount market is at one and the same time under the quasi-monopolistic control of the Discount House syndicate and the influence of the Authorities' operations. Similar kinds of objection apply to using other short term interest rates such as the rate on call money. In consideration of these difficulties the yield on short bonds has been used as an alternative indicator; whilst it would not be expected that identically similar results would be obtained, the results of using one index of the short-term rate of interest should not differ too much from those obtained in using the other.

We have already observed that towards the end of the period much higher velocities are associated with a given level of the interest rate; this is true whichever interest rate is used. In the case of the treasury bill rate, for example, 1959 velocities of 0.569 to 0.615 are associated with a range of treasury bill rates between 3.174 and 3.479, whilst in 1955 lower velocities, between 0.494 and 0.554, occur in a treasury bill rate range of 2.909 to 4.086. This drift to higher velocities at given interest rates can best be seen from the two time series graphs (III and IV).

It is not clear how continuous Minsky—or the Radcliffe Report—supposes shifts in the velocity-interest curve to be; but if it is plausible to assume that major bursts of innovation have a long gestation period, and that tight money policies (especially policies which concentrate control directionally on a few recognized banks) provide the necessary stimulus, then it would be logical to look to the period when de-control begins for evidence of any shift that may have occurred. It is clear that, with the exception of part of 1954, the whole period up to 1958 can be regarded as a régime of restrictive monetary policies, whilst in 1958 itself the dismantling of the controls began. Nevertheless, as can be ascertained from Table 2, control over the supply of money was not significantly relaxed (indeed, the income velocity of circulation continued to increase during 1959). Table 3, which shows the growth, from year to year, in deposits with a range of financial institutions whose liabilities can be thought of as liquid, demonstrates the great increase in non-money financial assets during 1959 after the de-control in 1958 had taken place.

The economic evidence, then, would suggest that if a ' shift ' occurred it would be most likely to have done so during 1958. This judgement is sup-

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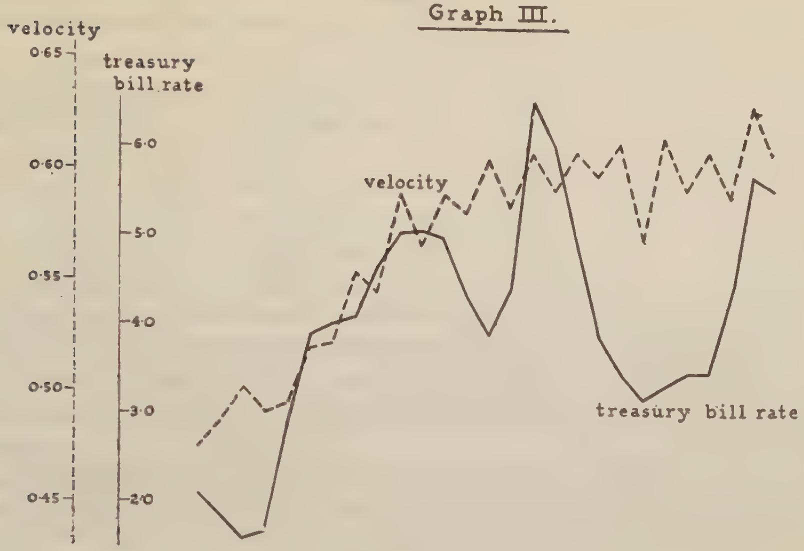
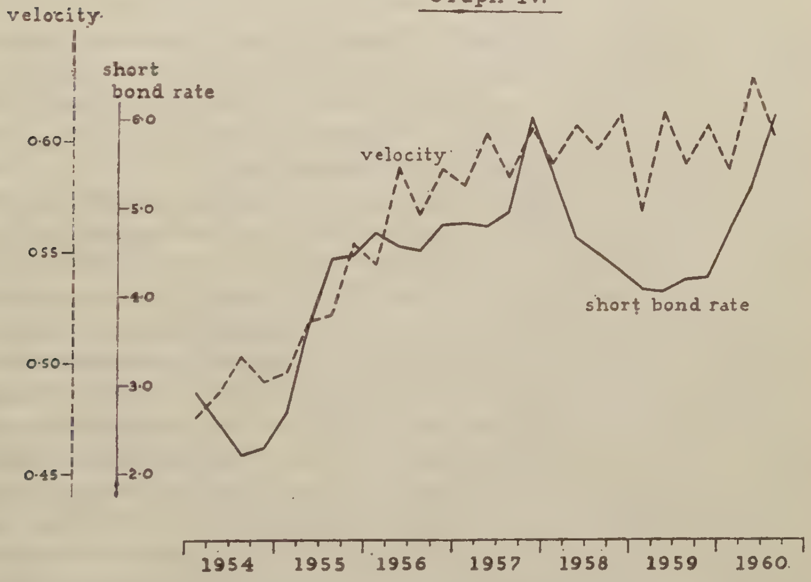
[1] This excuse for using G.D.P. figures seems to be quite sufficient in the circumstances; the measurement of income velocities has always been bedevilled by controversies over the suitable definition of ' money supply ' and ' income '; G.D.P. has never been, so far as I know, considered as a candidate for the latter. However, even the principles of choice between G.N.P., N.N.P., personal and disposable income are not very clear and since G.D.P. does not move in a way too different from G.N.P. and N.N.P., honour can be maintained and expediency satisfied without resort to insistence on essentially arbitrary definitions.

Graph III.



Graph IV.



ported by the statistical evidence (Table 2 and Graphs I and II). For the purpose of demonstrating the extent of the shift more effectively a precise dating for the shift has been assumed in the third quarter of 1958, although it must be borne in mind that the selection of this particular quarter of 1958 rather than another is essentially arbitrary. The regression lines shown in the two Graphs I and II, then, have been drawn up, in each case, for the observations of the period 1954–1958 II; observations for this period are shown as dots, and those for the succeeding period (1958 III—1960 III) as

TABLE 3

Increases from year to year in supply of money, and deposits with other financial institutions in percentage form

	(1) Money Supply	(2) Deposits with other Banks	(3) Deposits with finance houses
Dec. 1953	—	—	—
1954	+1.9	+0.7	—
1955	−2.4	−1.3	+67.5
1956	+1.0	−1.6	− 5.5
1957	+3.1	+1.7	+61.0
1958	+2.7	+0.6	+35.5
1959	+5.0	+6.4	+56.5
1960	−6.1	+6.5	+38.3

Definitions. (1) Money supply is defined as in Table 1. End-Year figures are used.

(2) Deposits with other banks include balance outstanding at year end in the Post Office Bank and Ord. Dept. of the Trustee Savings Bank, the deposits of United Kingdom residents with U.S. banks in London, British Overseas Banks, Accepting Houses and other foreign banks and the funds of the Disc. Market borrowed from 'other sources' (*i.e.* excluding banks). As far as possible end-year figures have been used; discrepancies should not be too large.

(3) Current and deposit accounts with members of the Finance House Association.

The figures are mainly those from *Memoranda of Evidence to Radcliffe Committee, Vol. 2,* supplemented by continuation of the series in the *Quarterly Bulletins of the Bank of England.* Figures for finance house deposits here have been drawn from the *Monthly Digest* and also those for the Post Office and Trustee Savings Banks.

crosses. The correlation co-efficients relating to the periods for which the regression lines have been drawn up are both very high; in the case of the treasury bill rate it is 0.858, and in the case of the short bond rate 0.898. The number of observations in the period following 1958 II is too small to allow the position and slope of a new curve to be ascertained.

The sophisticated quantity theorists can still accommodate the phenomenon of a shift in the velocity-interest curve, if the rationale of the shift process can be explained in a certain way. If, for instance, the shift can be ascribed simply to the growth of a stock of near-money (*i.e.* the growth of a stock of money substitutes), which is not systematically connected with the implementation of tight money policies, and if the shift is thus a once-for-all or occasional occurrence, then the quantity theoriest can continue to theorise on the assumption of a dependable relationship, and to advocate the same kind of policy (if necessary, in heavier doses). If the Radcliffe Report's 'liquidity' concept is interpreted in the quantitative manner (and given that para. 392 of the Report purports to be a demonstration of the effect of liquidity on a certain monetary relationship) then it might be logical to conclude that all that is necessary in these circumstances is to implement quantity theory policies more energetically. There are reasons for thinking, however, that this is not a correct piece of reasoning: first of all, as we have already seen, liquidity is not readily definable as some given stock of financial assets; secondly, the Radcliffe Report has a good deal to say on the determination of interest rates in addition to the comments in para. 392; thirdly, the wording of para. 392 is not detailed enough to warrant the conclusion, on the basis of that paragraph alone, that the 'Radcliffe theory' on the effect of liquidity on the velocity-interest rate relationship is one which can be accommodated to a quantity-theory position. The general tenor of the Report—in particular the accent on the effect of changing expectations on monetary relationships and the emphasis on the flexibility of the financial system—suggests that the model for para. 392, is not an advanced quantity theory model but the Minsky model. In this model, as we have already seen, there is no question of ' assuming other things to be equal ', since the very existence of high interest rates and tight money policies is sufficient to increase the incentive to innovate in the financial sector, and thus to infringe the cet. par. conditions.

It is in fact fairly clear that the Radcliffe Report does not suggest that the determination of interest rates is, or need be, left to the interaction of a stable demand function for money (modified only by occasional autonomous shifts) and the supply of money relative to the level of the national income. Since, in some cases, a rise in velocity occurs along with a rise in interest rates, and in other cases not, (as in Graphs I and II), a good deal must be attributed to the influence of the ' package deal ', both on psychology and on the physical framework of the financial sector. The increase in velocity which occurred between the third and fourth quarters of 1957 is no greater than that which occurred between the first and second quarters of 1959. It would be absurd to ascribe the startling difference between the movements of the rate of interest in these two periods to a shift in the curve, where all other things remain the same. The authorities in the Summer and Autumn of 1957 were very eager that other things should not remain the same.

In the Report itself the committee clearly state that they regard the Authorities as having power over interest rates other than their power over the quantity of money. In para. 504, policies operating on the supply of money as ' the centrepiece of monetary policy ' are distinguished from those that have interest rates as the centrepiece of action. In para 397 it is asserted that control over the supply of money is ' only incidental to interest policy '—which is a more reasonable thesis. It is not correct to extract para. 392 as the ' Radcliffe Report Theory ', and particularly not if the interpretation of the theory suggested in para. 392 is of a type which automatically accommodates it to a quantity theory viewpoint. In fact, as some critics have noted, the Radcliffe Report is inclined to view expectations as the prime mover in interest rate determination.[1] To those who believe it is possible to salvage the essentials of quantity theory by making concessions to liquidity as a stock of near-money, this is an unpalatable conclusion, and they are thus driven to deride it, ignore it, or maintain that it is inconsistent with the para. 392 doctrine. But, as we have seen, it is not at all clear whether the doctrine expressed in para. 392 can be assimilated to a quantity theory viewpoint, or is more akin to the Minsky thesis; whilst an emphasis on expectational influences would certainly not be incompatible with the latter interpretation, it consorts less comfortably with the former.

[1] A view characterised by Gurley, in his review article ' The Radcliffe Report and Evidence ', *American Economic Review* (Sept. 1960) as ' the theory that interest rates are determined by words and faces

The Economic Effects of the rate of interest

As we have seen, the Radcliffe Report, in addition to denying the 'magical' effects of crude quantity theory, also denies to variations in the supply of money an all-important role in the determination of interest rates. In so far as the Report is thus maintaining that the demand function is neither simple nor stable, and in so far as it suggests that the authorities have some control, not only of the supply of money but also over the demand for it (through the creation of certain states of expectation), the Report effectively denies the assumptions on which the sophisticated quantity theorist works. The circle is closed with the further denial that interest rates have a substantial effect in influencing decisions to borrow and spend, and hence on price levels.

An examination of the Report's analysis of the effects of interest rates sheds further light on the concept of liquidity, and the following discussion is carried on under the headings of ' interest-incentive ' and ' liquidity ' effects, categories suggested by the Report itself.

The Interest Incentive Effect

The Committee concluded that the effective ' bite ' of interest rates—both short and long—on the body of spending and borrowing decisions is small, directional and delayed (see especially paras. 386–440).

In making these claims the Committee was not saying anything very new, and it should be said that the evidence of questionnaires submitted to it on this subject would not alone have been sufficient to support a scepticism about the interest incentive effect.[1] The fact remains, however, that ever since the well-known enquiry by Oxford economists in 1938,[2] theorists have been engaged in suggesting reasons why the direct effect of interest rates may not be very great; these contributions are probably more important than the evidence of subsequent questionnaire surveys, which may all be suspect for the reason that businessmen are expected to rationalize complex decisions in retrospect, and may well choose to omit the more minor factors influencing such decisions, which does not, of course, mean that those factors are totally insignificant.[3] The factors which suggest that the committee was right in its comments on the interest incentive effect can be summarily set out as follows[4]:

(1) Risk and the length of life: where the risk of obolescence is high and the prospective life of capital equipment short, depreciation payments will swamp interest payments and the prospective rate of return is likely to dwarf

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[1] Gurley, in his review in the *American Economic Review* (Sept. 1960) makes it quite clear that he regards the committee as having gone *against* the trend of the evidence on this matter. This is too strong; an equally impressive case can be made out for the alternative view and the motivation ascribed by Gurley to the committee is necessarily based on circumstantial evidence alone.

[2] *Oxford Studies in the Price Mechanism* (ed Wilson and Andrews).

[3] A comprehensive bibliography of the interest-rate controversy is given in a series of footnotes by Dow, *Memorandum of Evidence to the Committee on the working of the Monetary System*, Vol. 3 (especially pp. 86–7).

[4] It will be obvious to the reader that the author has derived great benefit, in preparing this section, from Balogh and Streeten's article 'A Reconsideration of Monetary Policy', *Bulletin of the Inst. of Stat.*, (1957).

the borrowing rate. The direct influence of interest rates is thus immediately concentrated on the non-risky, long-life investment.[1]

(2) Taxation System: The fact that interest payments are deductible for tax purposes means that a given change in the rate of interest has a lessened effect on the demand for investment goods if it is the absolute changes in percentage rewards that is important.[2]

(3) The extension of the public sector: The extension of the public sector has brought a large part of the interest-sensitive investment sector under direct public control. The use of the rate of interest in this case is thus either redundant (since investment plans can be modified by political decision) or wasteful (in that if no modifications are made to the investment plans, the effect is to raise the cost).

(4) The extension of the full-cost pricing sector: It is open to oligopolistic industries (and, a fortiori, monopolies) to pass on increased interest charges in the form of higher prices. The evidence furnished to the Committee by the National Union of Manufacturers[3] was explicit on this point: 'the increased cost of borrowing has been regarded, in a period of general and continuing inflation, merely as one among many increased costs, to be passed on as far as possible in higher prices.'[4]

(5) The bias against the small firm: the difference between borrowing and lending rates removes from the margin of decision all those firms which typically rely upon reserves of undistributed profits for their investment finance. On the other hand the smaller firm, or the fast-grower, which soon exhausts its reserves, is forced to borrow from outside at the going borrowing rate: but, in addition to meeting the cost of extra interest charges on what is borrowed, the small firm is likely to find itself faced with the problem of providing adequate security for a loan, or of risking a possible loss of control by going into the new issues market. Even where the problems of providing security or maintaining control are not to the fore, the small firm may find itself forced to pay more than the large firm for the privilege of borrowing money.[5]

(6) The lagged effect of interest charges: The Radcliffe Report also suggested (456) that the effect of interest rates could be lagged by a year or more, since firms were sometimes induced, by the prospects of increasing interest rates, to postpone altogether work on projects which had barely been conceived, rather than to postpone work on projects actually under way. (This

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[1] Shackle, *Economic Journal* (1946), Henderson (*Oxford Studies in Price Mechanism*), have provided the theoretical justification for this; Klein and Goldberger (*An Econometric Model of the U.S.*)—among others—have furnished empirical evidence.

[2] This is worked out more fully in Balogh and Streeten, *op. cit.* See also the Radcliffe Report, para. 451, '. . . we were told also how taxation in effect halves the interest cost; this belief has evidently bitten so deeply into business consciousness that it may well weaken the force of interest rate changes even when it is not strictly applicable.'

[3] *Memo. of Evidence, Vol. 2,* p. 137.

[4] In addition, oligopolistic conditions typically lead to increased profits and investment reserves, immunising the industry from 'outside' monetary conditions: Steindl '*Maturity and Stagnation in American Capitalism*'.

[5] See Steindl, *op. cit.* and '*Small and Big Business*', also Kalecki, '*Essays in the Theory of Economic Fluctuations*.'

phenomenon was confined largely to small and medium-sized firms, and perhaps as much reflects the bias against firms of this size as the effectiveness of interest charges themselves.)

There is therefore good reason to support the Radcliffe Report's view that the interest incentive effect is of minimal importance as a weapon of control, and that, in so far as it works, it does so directionally.

The committee was equally sceptical of the effectiveness of short term rates of interest, and the view that variations in the short rate can affect production via stock-building for 'we have found that stocks of commodities are extremely insensitive to interest rates' (486). It is not so clear that the committee had, in their evidence, a warrant for making so firm a claim as this, nor is the body of evidence on this subject by any means as extensive as that relating to the effectiveness of long rates. In fact, the debate initiated by Keynes and Hawtrey on this question several years before the war, has hardly been advanced at all.

In his written evidence to the committee,[1] Sir Ralph Hawtrey laid renewed emphasis on his familiar theory that 'borrowing for the purchase of materials for sale or for the purchase of materials for use in production is bound to be sensitive to the terms of lending'[2]; but no discussion of this view took place when Hawtrey gave oral evidence to the committee. Of the other witnesses who gave evidence, most of the industrialists were sceptical of the effectiveness of short term rates on stock-building, although there were some important exceptions—witnesses from the Multiple shops Federation disagreed completely on this question,[3] those for the Scottish Chambers of Commerce[4] claimed to have heard that retailers had responded to the credit squeeze by making smaller and more frequent orders, whilst witnesses for the Federation of Wholesale Organizations[5] were almost vehement in asserting that interest charges made a significant impact on stocks.

Impressionistic evidence of this type, which the committee gained by questioning witnesses was, on the whole, biassed against the view expounded by Hawtrey. Further evidence, based upon questionnaires and surveys carried out at the committee's request, was more mixed. The questionnaire carried out by the Association of British Chambers of Commerce in March 1958[6] showed that 4 per cent of those respondents who had reduced their stocks, or cut their expenditure on investment, named higher costs of borrowing as the principal consideration. The special survey carried out in Birmingham,[7] which showed that 40 per cent of those firms which had cancelled or postponed their plans since 1955, did so because of increased costs of borrowing, did not single out stocks for special consideration.

A further survey was presented to the committee, by the Federation of

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[1] *Memo. of Evidence, Vol. 3,* pp. 117–123.
[2] *Op. cit.,* para 26.
[3] *Memo. of Evidence, Vol. 2,* p. 138 f., and *Min. of Evidence* Qn. 8143–8210.
[4] *Memo. of Evidence, Vol. 2,* p. 97 ff. and *Min. of Evidence* Qn. 8857–8992.
[5] *Memo. of Evidence, Vol. 2,* p. 150 ff., and *Min. of Evidence* Qn. 6686–6750.
[6] *Memo. of Evidence, Vol. 2,* p 85 ff and *Min. of Evidence* Qn. 11114–11180
[7] ***Supra*** .

British Industry,[1] and this showed that 178 out of the 1595 respondents had reduced stocks during 1957 as a result of ' difficulty in borrowing '; 184 had refrained from stock-building in that period for the same reason. In evidence, the results of these questionnaires were qualified by the witnesses, partly because of the high non-response rate common to them all, and partly because it was felt that business men could not be expected to rationalise in retrospect their reasons for reducing stocks or postponing investment; in particular it was felt that a good deal of the reduction in stocks and postponement of plans must have been due to a recession in activity, and was not directly due to the effect of interest charges.

The evidence presented to the committee on this question, was, therefore, somewhat mixed in character, but it became clear, both from the evidence of academic economists,[2] and from the responses of other witnesses, that there are strong a priori objections to the unmodified view that stocks are sensitive primarily to interest rates. Most commercial witnesses took the view that the risk of being caught ' out of stock ' was worth insuring against, however high the premium (in the form of interest charges) might be. The benefits of bulk-buying, the maintenance of constant production flows, coupled with the influence of views on the likely course of prices and demand, also severely restrict the scope for interest rates in varying stock levels, especially when such a large proportion of stocks is not in fact carried on short term finance at all.

Hawtrey, in his written evidence, agreed that in those cases where costs of storage, insurance and handling were relatively large, stocks would not be interest-sensitive, but he maintained that the other ' technical ' factors cited above were important only in so far as they set maximum and minimum tolerable levels of stocks, the rate of interest being responsible for determining the actual stock level between these limits. In reviewing its policy of raising Bank Rate in June 1960,[3] the Bank of England also professed the view that increased interest charges would have beneficial effects in reducing stocks, both through the increase in the cost of holding stocks, and by moderating expectations of a price rise. (Evidently, neither of these assumptions was a reliable datum.)

The fact of the matter is that it is not known to what degree stocks are interest-sensitive; the balance of a priori judgements does not accord with the Hawtrey thesis, but it remains possible that stocks of *some* goods (where costs of storage, handling, etc., are not high), and stocks held in *some* sectors of the market (especially, perhaps, the wholesaleing sector, where short term finance is widely used) would prove to be interest-sensitive if there were adequate data outstanding on which to perform tests. In fact, present official figures, though recently much improved in coverage, do not afford a sufficiently long and consistently based time series or a sufficiently fine breakdown by type of holder or character of commodity stocked to make a thorough statistical analysis possible. In view of the allegedly crucial nature of stock-building for the balance of payments it is to be hoped that some further empirical work based on wider information can at some stage be carried out.[1] It might be added that if this digression has indicated the possibility that stocks held in the wholesale sector might be interest-sensitive, then for policy purposes, this would have to be balanced against the probability that manufacturers' stocks may counter-adjust to variations in wholesalers' stocks. Although from 1957–1960 III, wholesalers' stocks formed, on average, 11.95 per cent of total stocks the variations in this proportion were quite marked. Witnesses before the committee certainly made it clear that when wholesalers run down stocks for reasons connected with a fall in demand, manufacturers take up the slack, maintaining output and building up their own stock.[2] Before reducing output manufacturers would even grant credit on ' cut-price ' terms.[3]

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[1] *Memo of Evidence, Vol 2*, p 114 ff., and *Min. of Evidence* Qn. 5525–5767

[2] See particularly, the evidence submitted by J. C. R . Dow, *Memo. of Evidence, Vol. 3*, paras. 94–100

[3] *Quarterly Bulletin of the Bank of England* (Dec. 1960).

Thus it can be seen that, both in the case of capital equipment and in the case of stocks, investment is unlikely to be significantly affected by movements in the rate of interest, at least not by movements in the normal percentage range. The committee's support for this contention, however, seems the stronger in the case of capital equipment than with stocks, but even in the latter case there is little doubt that interest effects will be severely qualified by other factors.

The Liquidity Effect

Although the Radcliffe Report regards the interest incentive effect (the effect on borrowers) as unreliable,[4] its enthusiasm for the ' liquidity effect ' (effect on lenders) is boundless. It argued that a ' movement of interest rates implies significant changes in the capital values of many assets held by financial institutions ' (393), and that a rise in interest rates will thus make financial institutions less willing to lend—in some cases because capital values have fallen, in others because the interest rates on which the institutions operate are sticky.

This view of the effective modus operandi of interest rates has long been current in the United States as the ' locking-in effect ', and was discussed, à propos of the U.K., by Nevin,[5] as the ' quantitative ', aspect of the rate of interest as a policy weapon. Despite all this, several observers[6] have claimed that the liquidity effect is no different from the interest-incentive effect, so that the Radcliffe Report is committing a logical howler in arguing that the one is reliable, and the other unreliable.

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[1] In his evidence to the committee (*Memo. of Evidence, Vol. 3*, p. 98, para. 158), J. C. R. Dow suggested that firms seeking bank credit for stock-building should submit returns on their stocks, so that fluctuations could be quickly detected, and methods of control devised.

[2] *Min. of Evidence*, Qn. 6695.

[3] *Min. of Evidence*, Qn. 6693.

[4] Thus, para. 386, ' we have sought, without much success, for convincing evidence of its presence in recent years.'

[5] *The Mechanism of Cheap Money*, pp. 312–331.

[6] See, for instance, Jasay, ' The Working of the Radcliffe Monetary System ', *O.E.P.* (June 1960) and Gaskin, ' Liquidity and the Monetary Mechanism ', *O.E.P.* (Oct. 1960).

The case for arguing that the two effects are the same rests simply on the assumption that a financial institution, whose asset values have been hit by a rise in the rate of interest, will continue to finance direct lending by liquidating its securities, and charging a higher rate of interest on its new loans, to recoup the capital loss. This is not, of course, how financial institutions do at present react to a change in interest rates, other than a change in Bank Rate; lending rates are typically tied to some institutional rate (like Bank Rate)—which may or may not allow recoupment, or, in some cases (*e.g.*, the building societies) lending rates are adjusted only with a lag to the movement of interest rates, whether institutional or not. Some of these rigidities would no doubt vanish if the authorities were actually to pursue an active monetary policy based on liquidity effects, but it is important to notice that the liquidity effect does not rely exclusively on the exploitation of institutional rigidities and market imperfections of which adjustment with reference to ' key ' rates, such as Bank Rate, is a symptom.

The Report points out (487, 488) that the argument for using interest rates as an economic weapon is an argument for widely fluctuating rates. It is an argument, in other words, for inducing different kinds of expectation and various degrees of uncertainty into the environment in which financial institutions operate. The liquidity effect will not operate if a rise in the interest rate is construed as permanent; in such a case, as Mrs. Robinson has pointed out,[1] there is no distinction to be made between real and book losses and it would be unrealistic to expect financial institutions to behave as if there were.

If, on the other hand, financial institutions are uncertain about the future level of the rate of interest, they are likely to be cautious about liquidating their securities *en bloc* to finance new lending (unless of course they expect even higher interest rates to ensue and to hold for a long time); if they do make loans it is as likely that they will raise their demands for proofs of creditworthiness from their customers, as require higher interest payment from them.[2] The pessimistic atmosphere would induce a greater degree of credit-evaluation—' banks can and do, vary their concept of a satisfactory borrower, as well as the rate of interest which they propose to charge him '.[3] In these conditions some would-be borrowers will be frustrated altogether, for although they may be willing to pay more for a loan they will be unable to provide the security for it.

That the Radcliffe Report's emphasis, in dealing with the liquidity effect, is actually on uncertainty, rather than on questions of lagged interest rates, has been confirmed by Professor Cairncross.[4]

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[1] In her article ' General Liquidity ' in the *The Banker* (Dec. 1960).

[2] Indeed the two go together—in the most elementary sense that to accept a loan at a high interest rate arouses the suspicion that default is more likely to ensure.

[3] Nevin, *The Mechanism of Cheap Money*, p. 315.

[4] ' Monetary Policy in a Mixed Economy,' *Wicksell Lectures* (1960), pp. 37–8.

Conclusion

This analysis of the Radcliffe Report's attack on quantity theory, and its introduction of ' the whole liquidity position ' as the conceptual basis for a theory of monetary policy shows that the stable—if not precise—relationships which characterize the quantity theorists' approach cannot be relied upon. The basis of an effective monetary policy is not, as it turns out, the fine adjustment of the supply of money (or of money substitutes), and the rate of interest, nicely calculated to reduce expenditure on the margin of profitability, but the inducement of certain kinds of expectations, the production (in emergency) of shocks, and the exploitation of uncertainty and market imperfections. Desired levels of the rate of interest are to be achieved by manipulating expectations, desired levels of demand by exploiting institutional rigidities, and bruising business confidence.

Yet the attractiveness of monetary policy has always been held to reside in the fact (or rather, the supposition) that it regulates levels of demand in an optimal manner; it has been contrasted favourably with direct controls which intervene ' arbitrarily ' in the market. The interest rate mechanism, on the other hand, was supposed to be capable of affecting total demand by inducing the advancement or postponement of projects on the marginal of profitability —interest entering as a cost of borrowing for all borrowers, as forgone income for those who finance their expenditure out of their own funds. Now it appears that higher interest rates are not only ineffective over large areas of industry but actually discriminate in terms other than profitability, against certain sectors of industry, so much so, that the diminution of expenditure by small firms may be counterbalanced by increased investment in the insulated oligopolistic sectors.

If the ' shock ' effect of monetary policy is to be relied upon to achieve a generalised and equable effect, three limitations are immediately apparent. First of all, whilst shock tactics may achieve an overall reduction in demand, they cannot achieve it in the equable way in which interest rates are supposed to work, for the simple reason that the reaction to psychological shock depends on the psychology of the subject, and it cannot be supposed that the psychology of entrepreneurs is uniformly similar. Secondly, shock effects are not capable of the fine adjustments of which the supply of money or interest rates are; and as a consequence of this the Authorities will constantly find themselves in a difficult position, knowing that if they underestimate the shock required they will have a more difficult job on the next occasion to make their tactics effective, whilst at the same time, if the shock is overdone, it will not be easy to rectify the situation. Thirdly, as the Radcliffe Report makes clear, the production of shock effects of one kind—the inculcation of business pessimism—is severely limited when the government stands committed to full employment policies.

Once it is recognized that the Radcliffe Report did not introduce ' the whole liquidity position ' as a proxy for the supply of money writ large—and that the Report's emphasis is on expectations and psychological atmosphere, the case for monetary policy as an optimal weapon disintegrates. This fact, plus the regrettable woolliness of the Report's own conceptual contributions, must largely explain why this recognition is not forthcoming.

WAGE-RATE DIFFERENTIALS OVER TIME

By DEREK ROBINSON

The importance of wage differentials has been commented upon frequently by academic writers,[1] and often argued by wage negotiators. Attempts to preserve or disrupt 'historic differentials' and 'traditional' or 'fair' relativities are a feature of many wage claims and, insofar as wage rates are accepted as an indication of a trade union's success, it is probable that the preservation or improvement of these differentials, alongside success at beating the index (cost of living) are two main criteria. The usual method of comparing inter-industry rates differentials over time is to compare the wage rates of the industries concerned at specified dates. To some extent the method of measurement adopted—percentages or absolute money amounts—will influence the results.[2]

For present purposes, movements in rates have been measured in absolute money terms, and, for simplicity of illustration, examples have been confined to cases where the industries concerned received exactly the same amount of increase. Where the original differential is thus undisturbed, one may be tempted to believe that both industries have done equally well (or badly). The temptation becomes almost irresistible when the industries seem to be associated or linked, and parity of rates exists at both dates. The most obvious weakness of this approach is that there is an element of arbitrariness in the dates chosen. This is an unavoidable handicap, which is not overcome in this paper. A further weakness is that the method is essentially one of comparison of two static situations. The dynamic aspect of movement from one wage rate level to another is ignored. This dynamic aspect has two elements: first the timing within the specified period of the various wage increases, and second the relative size of the particular increases received by each industry, which must of course come to the same total increase over the full period. The interplay of these two elements can be such as to give a clear and significant difference in total income from wage increases over the period to members of one of the industries even though the historic differential has been preserved.

A monetary measure of the importance of these two elements can be devised and there are a number of classes within which the types of variations of movement of wage-rates can be put. The first measurement used is the *total of wage increases* received during the period, obtained by calculating the total amount of wages received, by a person paid the agreed wage rate, as a result of wage increases granted during the period, and is therefore a cumulative figure.[1] In calculating this the effect, if any, of holiday pay as distinct from payment of the contemporary wage rates has been ignored. Where a wage increase was granted during the middle of a calendar week, Saturday has been counted as a full working day, i.e. one sixth of a pay-week. The distortion caused by this can hardly be more than 1s. to 2s. on the occasion of the wage increase and can be ignored. From Table I, it can be seen how *total of wage increases* is calculated. From these *totals* of different industries one can see how much particular industries have gained and figures of *net gain* can be obtained. A simple but useful device is to spread this *net gain* over the full period concerned, thereby providing a *hypothetical additional wage rate* for that industry.

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[1] See, *inter alia*, L. G. Reynolds and C. H. Taft, *The Evolution of Wage Structure*, Yale, 1956; J. T. Dunlop, *The Theory of Wage Determination*, 1957; A. M. Ross and W. Goldner, 'Forces affecting Inter-industry Wage Structure,' *Quarterly Journal of Economics*, May, 1950; Baroness Wootton, *Remuneration in a Welfare State*, 1961.

[2] For a discussion of this point see Ross and Goldner, *op. cit.*

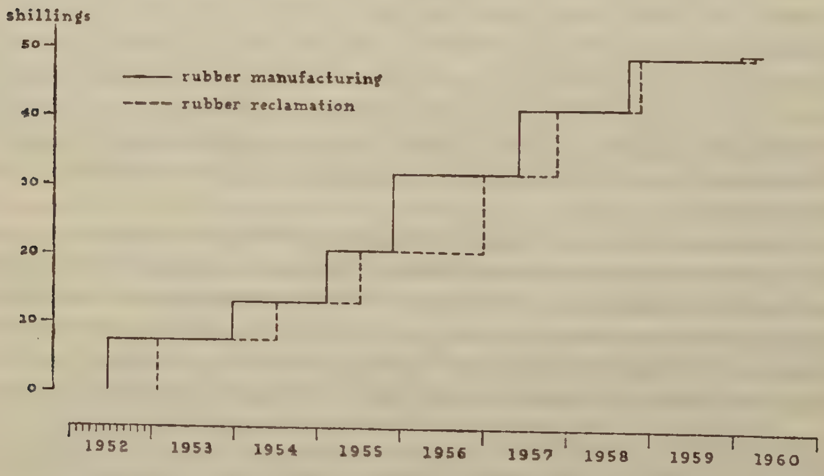
The period concerned is from 6/1/52 to 30/4/60—434 full pay weeks. The wage rates are those of ' Unskilled ' workers in the industries concerned, and the data obtained from the details of wage rates issued by the Transport and General Workers' Union as amendments to its Handbook.

Follow-my-leader

This is the simplest example and is based on 'wage leadership' in its most obvious form, where the industries appear to be associated or similar. From a position of parity of rates the leader jumps forward by securing an increase. Sooner or later he is caught as the follower obtains exactly the same money increase. The equilibrium is maintained for a period until the leader once again jumps forward.

	Rate 6/1/52	Rate 30/4/60	Increase
Rubber Manufacture	112/6	162/0½	49/6½
Rubber Reclamation	112/6	162/0½	49/6½

Diagram I.



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[1] It is emphasised that throughout this paper we are concerned with wage rates and not earnings.

Wage rates of both industries are determined by Joint Industrial Councils.[1] They each received six wage increases of exactly the same amount, and a reduction of weekly hours from 45 to 42½ accompanied by an upward adjustment of wages of 8½d. a week, during the period. On each occasion Rubber Manufacture received the increase in rates (and the reduction in hours) earlier, by periods varying from 2 to 13 months.

Wage-Rate Increases: Table 1

From	*To*	*No. of weeks*	*at*	£	s.	d.
Rubber Manufacturing						
16/6/52	17/12/53	78⅔	7/6	29	10	0
18/12/53	5/2/55	59⅓	13/1½	38	18	9
6/2/55	21/11/55	41⅙	20/7½	42	9	1
22/11/55	28/5/57	79⅙	31/10½	126	3	5
29/5/57	18/9/58	68⅓	41/3	140	18	9
19/9/58	30/1/60	71⅓	48/10	174	3	5
31/1/60	30/4/60	13	49/6½	32	4	0½
	Total increase ...	...	... ...	584	7	5½
Rubber Reclamation						
28/1/53	2/7/54	74½	7/6	27	18	9
3/7/54	1/7/55	52	13/1½	34	2	6
2/7/55	30/12/56	78⅙	20/7½	80	12	2
31/12/56	16/11/57	46	31/10½	73	6	3
17/11/57	13/11/58	51⅔	41/3	106	11	3
14/11/58	31/3/60	72	48/10	175	16	0
1/4/60	30/4/60	4⅓	49/6½	10	14	8
	Total increase ...	...	... ...	509	1	7

Total of wage increases:

	£	s.	d.	
Rubber Manufacturing	584	7	5½	
Rubber Reclamation	509	1	7	
Net gain	75	5	10½	a week

Hypothetical additional wage rate 3/5½ a week.

The time-lags before the receipt of the wage increases by Rubber Reclamation were therefore equivalent to a loss of £75 5s. 10½d. over the full period, or 3s. 5½d. a week, to a worker assumed to have been working in that industry throughout the period 6/1/52—30/4/60.

Wages Councils provide a further example of 'follow-my-leader' in the clothing trade.

	Rate 6/1/52	Rate 30/4/60	Increase
Readymade and Wholesale Bespoke Tailoring	93/6	152/2	58/8
Dressmaking, Women's Light Clothing—England and Wales	93/6	152/2	58/8

Both industries received exactly the same six wage increases but Tailoring led on each occasion by periods ranging from two weeks to three months.

The advantages of being the leader are clear. One way of avoiding the penalties of being perpetually a follower chasing the leader is to change the rules a little so that the 'leadership' changes hands.

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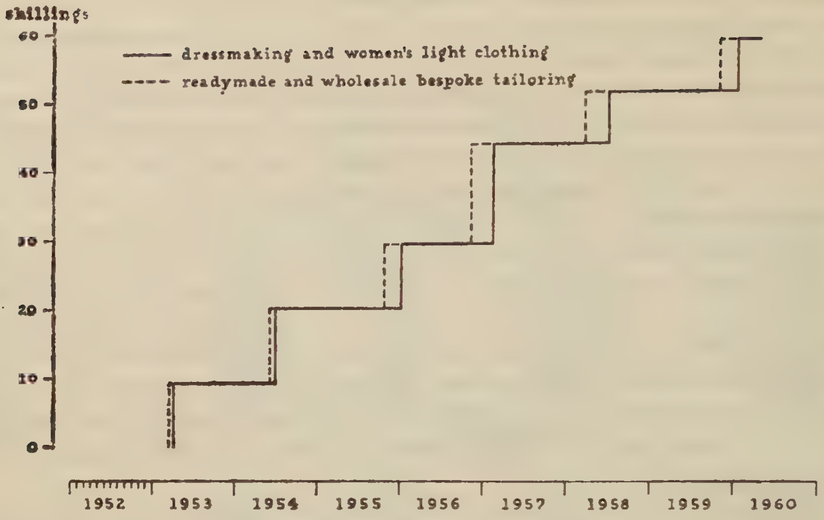
[1] Wages Councils existed for these industries for part of the period; the wage rates shown are those determined by Joint Industrial Councils.

Diagram II.



Wage-Rate Increases: TABLE II

Readymade and Wholesale Bespoke Tailoring

From	*To*	*No. of weeks*	*at*	£	s.	d.
16/3/53	3/6/54	63⅔	9/2	29	3	7½
4/6/54	25/10/55	72¾	20/2	73	5	5½
26/10/55	4/11/56	53⅔	29/4	78	14	3
5/11/56	23/3/58	72	44/–	158	8	0
24/3/58	3/11/59	84⅓	51/4	216	9	1½
4/11/59	30/4/60	25⅔	58/8	75	5	9½
	Total increase ...	...	... ...	631	6	3

Dressmaking Women's Light Clothing (E & W)

1/4/53	1/7/54	65⅓	9/2	29	18	10½
2/7/54	12/1/56	80	20/2	80	13	4
13/1/56	14/2/57	57	29/4	83	12	0
15,2,57	3/7/58	72	44/–	158	8	0
4/7/58	28/1/60	82	51/4	210	9	4
29/1/60	30/4/60	13⅓	58/8	39	2	3
	Total increase ...	...	... ...	602	3	9½

Total of wage increases:

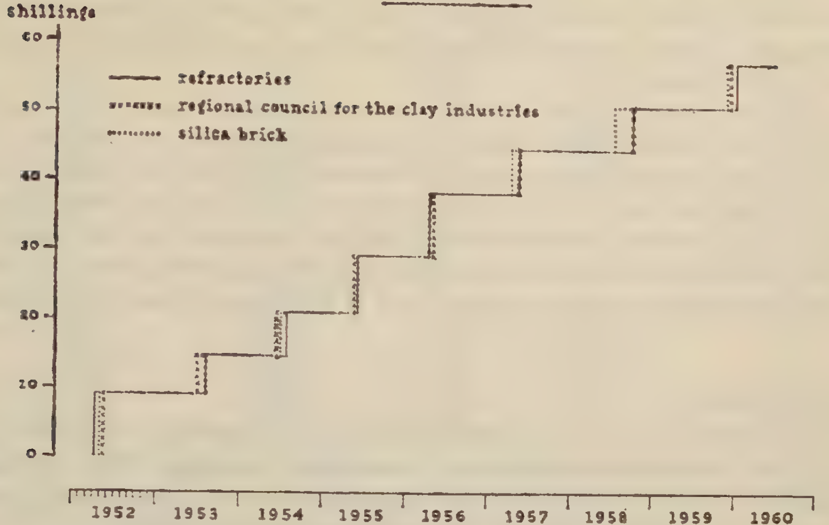
	£	s.	d.
Tailoring	631	6	3
Dressmaking	602	3	9½
Net gain	29	2	5½

Hypothetical additional wage rate 1/4d. a week.

Follow-my-changing-leader

Here, as in the previous case, the amounts of the various component increases received by the industries are exactly the same for all concerned, but the timing, or effective dates of the increases vary from one industry to another. There is one important difference; the 'leader' in time is not the same on all occasions.

Diagram III



Wage-Rate Increases: TABLE III

Refractories		*Clay Brick and Tile*				
From	*To*	*No. of weeks*	*at*	£	s.	d.
12/4/52	7/8/53	69	9/2	31	12	6
8/8/53	23/7/54	50	14/8	36	13	4
24/7/54	27/5/55	44	21/1	46	7	8
28/5/55	6/4/56	45	29/4	66	0	0
7/4/56	10/5/57	57	38/6	109	14	6
11/5/57	23/9/58	71½	44/11	160	11	6½
24/9/58	1/1/60	66½	51/4	170	13	8
2/1/60	30/4/60	17⅙	57/9	49	11	4½
				671	4	7
Regional Council for the Clay Industries						
10/5/52	5/7/53	60⅙	9/2	27	11	6
6/7/53	19/6/54	50	14/8	36	13	4
20/6/54	20/5/55	47⅚	21/1	50	8	6
21/5/55	24/4/56	48½	29/4	71	2	8
25/4/56	10/5/57	54½	38/6	104	18	3
11/5/57	23/9/58	71½	44/11	160	11	6½
24/9/58	30/11/59	61⅚	51/4	158	14	1
1/12/59	30/4/60	21⅚	57/9	63	0	10½
				673	0	9
Silica Brick						
3/5/52	7/8/53	66	9/2	30	5	0
8/8/53	26/6/54	46⅙	14/8	33	17	1½
27/6/54	27/5/55	47⅚	21/1	50	8	6
28/5/55	6/4/56	45	29/4	66	0	0
7/4/56	26/4/57	55	38/6	105	17	6
27/4/57	8/7/58	62½	44/11	140	7	3½
9/7/58	27/11/59	72½	51/4	186	1	8
28/11/59	30/4/60	22⅙	57/9	64	0	1½
				676	17	2½

Six sectors of the Clay, Brick and Tile industry each received eight increases of exactly the same amount. Three sectors are sufficient to demonstrate the effect of changing leadership as they show the two limits of the six and a middle case.

The wage-rates for all six were 109s. 1d. on 6/1/52 and 166s. 10d. on 30/4/60, an increase of 57s. 9d. The maximum lag for any increase of a specified amount was eleven weeks. No sector led on every occasion. *Total of wage increases* ranged from £671 4s. 7d. to £676 17s. 2½d., a *net gain* of £5 12s. 7½d., which is equivalent to about 3d. a week over the full period, a quite small spread in view of the number of sectors involved, and of relatively little importance in relation to the ' cost ' of following the same wage leader.

Leap-frogging

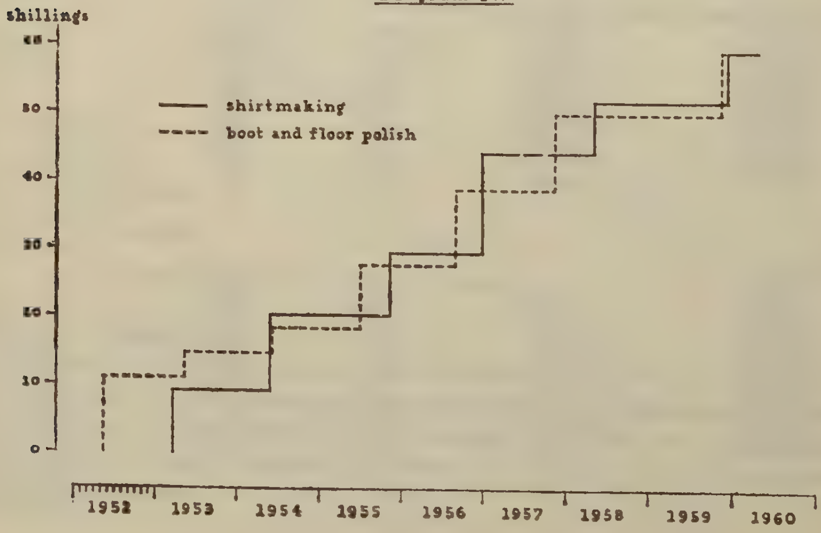
In this case there is no suggestion that wage leadership is involved and therefore the industries need not be ' associated ' or similar. The necessary conditions are that wage rates at the beginning and end of the period should be equal. Two Wages Council industries provide the example.

	Rate 6/1/52	Rate 30/4/60	Increase
Shirtmaking	100/10	159/6	58/8
Boot and Floor Polish	100/10	159/6	58/8

Shirtmaking received six increases and Boot and Floor Polish seven.

After a hesitant start by Shirtmaking the two successfully leap-frogged by receiving increases of different amounts on different dates, so that the industries alternated in paying a higher wage rate for a period of time.

Diagram IV.



Wage-Rate Increases: TABLE IV

Boot and Floor Polish				
From	*To*	*No. of weeks*	*at*	£ s. d.
7/5/52	14/5/53	53⅓	11/–	29 6 8
15/5/53	8/6/54	55⅔	14/8	40 16 5
9/6/54	30/6/55	55⅓	18/4	50 14 5
1/7/55	30/8/56	61	27/6	83 17 6
31/8/56	14/11/57	63	38/6	121 5 6
15/11/57	17/11/59	104⅔	49/6	259 1 0
18/11/59	30/4/60	23⅔	58/8	69 8 5½
				654 9 11½
Shirtmaking				
18/3/53	30/5/54	62⅔	9/2	28 14 5
31/5/54	3/11/55	74⅔	20/2	75 5 9⅓
4/11/55	20/12/56	59	29/4	86 10 8
21/12/56	4/5/58	71⅓	44/–	156 18 8
5/5/58	10/12/59	83⅔	51/4	214 14 10⅔
11/12/59	30/4/60	20⅓	58/8	59 12 10⅓
	Total increase ...	... ...	... ...	621 17 3⅓

Total of wage increases:

	£ s. d.
Boot and Floor Polish	654 9 11½
Shirtmaking	621 17 3⅓
Net gain	32 12 8

Hypothetical additional wage rate 1/6 a week.

So far the cases examined have been confined to industries with parity of rates at the beginning and end of the period. There are occasions however when industries with different rates receive the same increases over the period thereby maintaining, in money terms, the original differential.

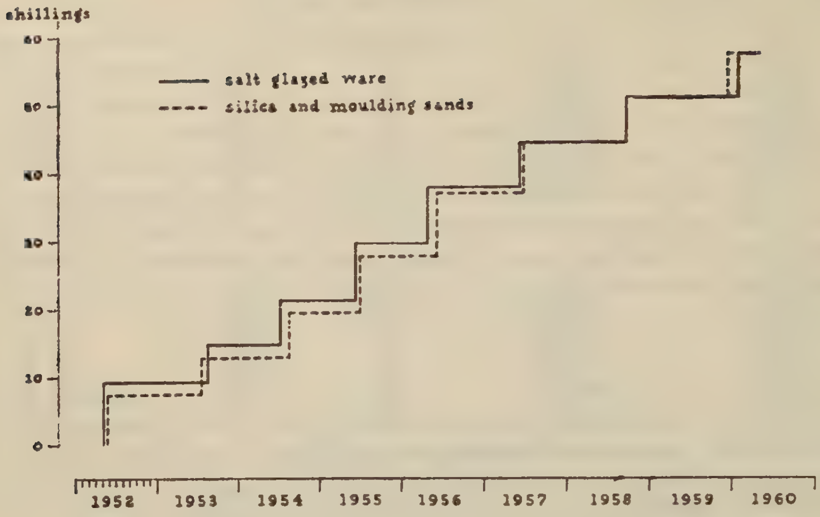
The Tortoise and the Hare

Two different sectors of the Clay, Brick and Tile industry are considered.

	Rate 6/1/52	Rate 30/4/60	Increase
Silica and Moulding Sands	110/–	166/10	56/10
Salt Glazed Ware	109/1	165/11	56/10
Differential	11d	11d	—

From Diagram V it can be seen that Salt Glazed Ware, the lower-rate sector, leapt ahead and effectively reversed the differential. Slowly Silica and Moulding Sands reduced the newly-formed gap and restored the original differential in rates in 1957, and even succeeded in obtaining the 'final' increase in November 1959 before Salt Glazed Ware. An analysis based on the two static situations approach shows that the differential was maintained. A dynamic analysis however presents a different picture.

Diagram V.



Wage-Rate Increases: TABLE V

Salt Glazed Ware From	*To*	*No. of weeks*	*at*	£	s.	d.
3/5/52	14/8/53	67	9/2	30	14	2
15/8/53	3/7/54	46⅙	14/8	33	17	1½
4/7/54	3/6/55	47⅚	21/1	50	8	5
4/6/55	22/4/56	46⅙	29/4	67	14	3
23/4/56	10/6/57	59⅙	37/7	111	3	8½
11/6/57	23/9/58	67⅙	44/–	147	15	4
24/9/58	29/1/60	70½	50/5	177	14	4½
30/1/60	30/4/60	13⅙	56/10	37	8	4
				656	15	8½
Silica and Moulding Sands						
24/5/52	17/7/53	60	7/4	22	0	0
18/7/53	13/8/54	56	12/10	35	18	8
14/8/54	17/6/55	44	19/3	42	7	0
18/6/55	1/6/56	50	27/6	68	15	0
2/6/56	21/6/57	55	36/8	100	16	8
22/6/57	23/9/58	65½	44/–	144	2	0
24/9/58	12/12/59	63⅔	50/5	160	9	10
13/12/59	30/4/60	20	56/10	56	16	8
				631	5	10

Total of wage increases:

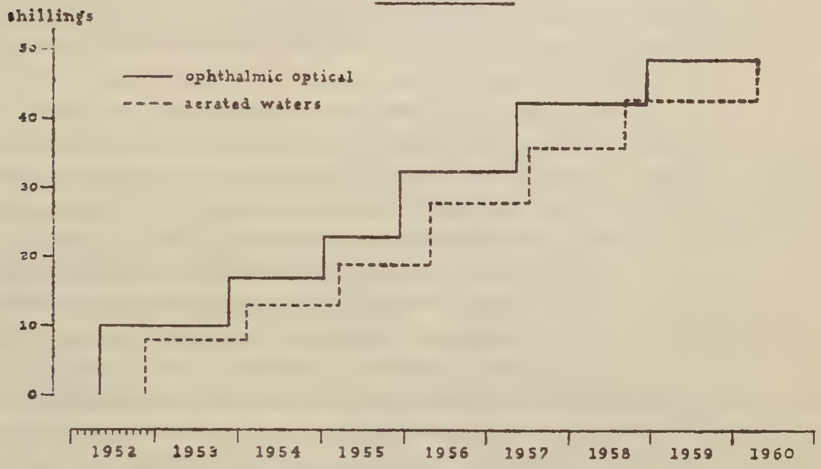
	£	s.	d.
Salt Glazed Ware	656	15	8½
Silicia and Moulding Sands	631	5	10
Net gain	25	9	10½

Hypothetical additional wage rate of 1/2d a week received by Salt Glazed Ware thus exceeds the ' static ' differential of 11d. a week in favour of Silica and Moulding Sands.

An even more striking example is that of two apparently unconnected industries, Aerated Waters and Ophthalmic Optical. Apart from—or because of—the differential in wage rates, a further difference is that weekly hours were 48 in Aerated Waters throughout the period, and 44 in Ophthalmic Optical.

	Rate 6/1/52	Rate 30/4/60	Increase
Aerated Waters	108/–	157/–	49/–
Ophthalmic Optical	103/–	152/–	49/–
Differential	5/–	5/–	

Diagram VI.



Wage-Rate Increases: TABLE VI

Ophthalmic Optical

From	*To*	*No. of weeks*	*at*	£	s.	d.
2/5/52	22/11/53	81⅓	10/–	40	13	4
23/11/53	9/1/55	59	17/–	50	3	0
10/1/55	4/12/55	47	23/–	54	1	0
5/12/55	12/5/57	75	32/6	121	17	6
13/5/57	14/12/58	83	42/6	176	7	6
15/12/58	30/4/60	72	49/–	176	8	0
	Total increase ...	...	... ...	619	10	4

Aerated Waters

				£	s.	d.
21/11/52	9/2/54	63⅔	8/–	25	9	4
10/2/54	17/3/55	57⅓	13/–	37	5	4
18/3/55	29/4/56	58⅓	19/–	55	8	4
30/4/56	9/7/57	62⅓	28/–	87	5	4
10/7/57	18/9/58	62⅓	36/–	112	4	0
19/9/58	28/4/60	84	43/–	180	12	0
29/4/60	30/4/60	⅓	49/–		16	4
	Total increase ...	...	... ...	499	0	8

Total of wage increases :

	£	s.	d.
Ophthalmic Optical	619	10	4
Aerated Waters	499	0	8
Net gain	120	9	8

Hypothetical additional wage rate 5/6½d., which effectively cancels out and reverses the 5/– a week ‘ static ’ differential.

In this race it is better to be the hare, for although the tortoise is ultimately successful in pushing to the front to restore ‘ historic ’ differentials, the reversal of the roles during the actual race may provide more than adequate compensation. However, the length of the race is of importance here.

Influence of the length of period chosen

The length of the race, or period under review, is, given the amount of *net gain*, the determinant of the *hypothetical additional wage rate*. The arbitrariness of the dates selected will influence the latter, once all the industries concerned have secured enough increases to restore either parity of rates, or the original differentials. In particular it is the length of time during which the original differentials, are maintained undisturbed (i.e. the time elapsing between the beginning of the period and the first increase received by an industry), and, similarly at the end, the length of time during which the original differentials are restored (i.e. the time from the last increase of any industry to the end of the period) which are important variables, subject to this arbitrary choice. Thus the period could have been extended (or reduced) in either direction, and provided that it was not extended to the point where an increase was received by one industry—or increases of differing amounts by all the industries included in the comparison, the figure of *net gain* would be constant. The number of weeks over which this would be spread to arrive at the *hypothetical additional wage rate* would, of course, be greater (or less) and the ' hypothetical addition ' smaller (or larger). This would be of relatively little importance where ' leadership '—either fixed or changing—took place, or with leap frogging, as the total figure of *net gain* would still provide an adequate measure of advantage. In the case of the tortoise and the hare however, the device of comparing the *hypothetical additional wage rate* with the actual wage rate differential would be affected. For example, if the period is extended by another 48 weeks from 30–4–60 and the wage rates of Aerated Waters and Ophthalmic Optical are assumed to remain unchanged, the *hypothetical additional wage rate* of the latter is reduced from 5s. 6½d. to 5s. a week, which is the actual differential. Any extension beyond this will bring the *hypothetical additional wage rate* below the actual differential.

Total Gross Wages

The concept of expected life earnings[1] has been reintroduced in a recent wage settlement.[2] A modification of this is to consider the total amount of wage rates actually received in different industries over a specified period. It may be that a worker in an industry with a lower rate both at the beginning and end of the period has nevertheless received more total wages during the period than a worker in an industry with higher rates at the beginning and end even though the differential may have actually widened. To measure this it is necessary to add up the total weekly wage rates received over the full period in the various industries or sectors of industries. This was done for 48 industries or sectors. In effect the difference between the *total gross wages* of any two industries is equal to the *hypothetical additional wage rate* minus the actual wage rate differential, spread over the period.

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[1] H. F. Clark, *Life Earnings*. Harper and Bros., 1937.

[2] Report and Minutes of Evidence of *Royal Commission on Doctors' and Dentists' Remuneration*. Cmnd. 939, 1960.

	Total Gross Wages £
Ophthalmic Optical	2,855
Aerated Waters	2,843

Difference = £12 over the full period of 434 weeks.
= 6½ a week i.e. the difference between the *hypothetical additional wage rate* of Ophthalmic Optical of 5/6½d. and the actual wage rate differential in favour of Aerated Waters of 5s.

This difference between *total gross wages* when spread over the full period will be referred to as the *compensatory spread.*

TABLE VII

Industry	Rate 6/1/52	Rate 30/4/60	Increase in rates	Total gross wages £	Compensatory spread
Stamped or Pressed Metal workers	97/2	154/–	56/10	2839	1/4d.
Shirtmaking	100/10	159/6	58/8	2810	
Differential	–3/8d.	–5/6d.		+29	
Pin Hook and Eye	99/11	157/8	57/9	2896	2/5½
Boot and Floor Polish	100/10	159/6	58/8	2843	
Differential	–11d.	–1/10d.		+53	
Gas	118/3	176/11	58/8	3276	11d.
Waterworks	118/3	176/11	58/8	3256	
Differential	—	—		+20	

Frequency of increases

It has been suggested that where the total increases in rates are of a similar amount, the industry where rates rise frequently will do better than one where the increases occur less frequently.[1] Using the terms of the present paper one would therefore expect that when industries are grouped by their *total increase in wage rates* the *net gain* would accrue to the industry in each particular group which had received the highest number of increases. In the following table the 48 industries were accordingly grouped.

These results at least suggest that it is not necessarily disadvantageous to secure fewer, but therefore larger, component increases which total to a specified amount. The crucial factors are the timing of the increases and the distribution in amounts of the component increases.

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[1] K. G. J. C. Knowles and E. M. F. Thorne, ' Wage Rounds 1948–1959 ', BULLETIN, Vol. 23, May 1961, p. 25n.

TABLE VIII

(1) Amount of increase in weekly rates[1] ...	43/1	46/6	49/–	49/6	56/10	57/9	58/8
(2) Spread of number of increase	5–7	7–8	6–7	7–8	5–8	7–8	6–8
(3) Number of increases providing highest 'total wages increase' and so ' Net Gain ' ...	5 L[2]	7 L	6 L	8 H[3]	7 M[4]	7 L	7 M
(4) No. of industries covered	3	3	3	3	8	10	8

[1] Increase of less than 1d. ignored.
[2] L = Least number of increases in group.
[3] H = Highest number of increases in group.
[4] M = Middle number of increases in group.

Conclusion

While the comparison of wage rates at specified dates is for many purposes a most useful measure of wage rates movement, the approach has serious limitations. The deficiencies are probably most important when wage negotiators and arbitrators accept the principle of linked or associated wage rates and industries. Here, merely restoring the *status quo* in wage rates and differentials is not sufficient to provide parity of remuneration over time, if there are time lags between the effective dates of wage increases. The easiest way of securing parity of remuneration is to make some wage increases retrospective. The same result could be obtained by changing-the-leader, or by introducing controlled leap-frogging.

On the other hand it may be considered desirable that there be lags in the passing-on of wage increases, and the creation of lags, or their extension in time, may be a part of an anti-inflationary policy. Also it may be that the ' leaders ' lead, not because the ' followers ' are too slow, but because the ' leaders ' are too fast. Trade unions may deliberately choose to tackle one particular sector first—on the grounds of profitability, ability to pay, traditional good relationships and satisfactory wage settlements etc.—and then use this as a lever on other sectors. The time-lag then becomes the variable factor and the size of the increase the constant one so far as the ' follower' is concerned. If this occurs then the comparison of differentials at two given dates cannot reveal this ' time dimension ' of wage bargaining.

AN INPUT-OUTPUT TABLE FOR EAST GERMANY WITH APPLICATIONS TO FOREIGN TRADE[1]

By WOLFGANG F. STOLPER *and* KARL W. ROSKAMP

Our main aim in this article is to present calculations of the capital and labour content of East Germany's exports and goods competitive with imports, similar to those made for the United States by W. W. Leontief[2] and for Japan by Tatemote and Ichimura.[3] This involved estimating an input-output table.

It goes without saying that our calculations, made without any help from official East German statisticians, rest on a number of extremely precarious assumptions, and it would thus be absurd to suppose that our estimates are anything like as reliable as the American or Japanese calculations which were based on official data available in great detail. The interest of our table lies in several directions: it enables us to check our earlier estimates of the East German G.N.P.[4] for consistency and order of magnitude. It should enable us to make some statements about the viability of the economy, in the sense that we are making explicit the restraints under which it operates. Thus it is an additional help in estimating whether particular production plans are feasible and internally consistent. The calculation of the capital and labour content of imports and exports, when put into the context of the input—output table, should enable us to judge whether or not the composition of imports and exports was reasonable or whether another pattern would have enabled the East German Economy to consume and/or save more.

Because of the nature of the data and of the estimating procedures we must first describe in sufficient detail the methods we have used. In the process we shall also present information on the pattern of investments which is of interest in itself.

ESTIMATING PROCEDURES

The Transaction Matrix. The basic information comes from our calculation of the East German G.N.P.,[5] which in turn is based on official East German data on output in physical unists, valued at West German prices of 1950. We have given in our book a detailed description of the methods we

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[1] We wish to thank Professor Daniel B. Suits and Dr. Tsuneo Ishikawa of the Research Seminar in Quantitative Economics at the University of Michigan, and Dr. Heinz Köhler, formerly of the University of Michigan and now at Amherst College for invaluable aid. We are also grateful for the financial support from the fund made available to the Department of Economics, University of Michigan, by the Ford Foundation.

[2] W. W. Leontief, ' Domestic Production and Foreign Trade; The American Capital position Re-examined ', *Proceedings of the American Philosophical Society*, Vol. 97, No. 4, September 1953; ' Factor Proportions and the Structure of American Trade; Further Theoretical and Empirical Analysis ', *Rev. Ec. Stat.*, Vol. XXXVIII, No. 4, November 1956.

[3] M. Tatemoto and Sh. Ichimura, ' Factor Proportions and Foreign Trade: The Case of Japan ', *Rev. Ec. Stat.*, Vol. XLI, No. 4, 1959.

[4] Wolfgang F. Stolper assisted by Karl W. Roskamp, *The Structure of the East German Economy*, Harvard University Press, 1960. Referred to later as *The Structure.*

[5] Stolper and Roskamp, *op. cit.*

used to calculate the G.N.P. and explained why we think it justifiable to value East German outputs at West German prices.

We divided the East German economy into 14 branches of activity. The choice of the number of branches is always a compromise between what is feasible and what is desirable. We wanted to have separate figures for the major branches of activity (industry, agriculture, etc.) and within industry to distinguish between those sectors favoured by the planners, the investment goods and basic industries, and the other industries mainly serving consumers, but also foreign markets. We have therefore distinguished ten manufacturing industries: mining and gas, electricity generation, metallurgy, chemicals, building materials, engineering (metal-working), electrical equipment and supplies, fine mechanics and optics, light industry, and food, drink and tobacco. The other branches of activity are agriculture, transport, construction, and finally 'unallocated', which comprises trade, personal and governmental services, and communications.

For our purpose it was essential to distinguish the three major investment goods producers, Engineering, Electrical Equipment and Supplies, and Fine Mechanics and Optics as well as the building industry. A special problem arises in the treatment of these industries, because they produce not only for final uses, in particular gross capital formation, but also produce inputs for the current production of other industries.

In addition to the value added of each industry and the inter-industry flows, the economy also has imports. In turn, total domestic production and imports are available for final uses (including exports). The value added of each industry corresponds exactly to the values given in *The Structure*. On the other hand, the sales values given in the table do not agree with those found in the book, because of the consolidation of industries and the elimination of intra-industry flows.

The entries in the transaction matrix (Table I) were made as follows. The distribution of electricity among the sectors is directly available from East German sources. Data exist also on the purchases of the mining and gas industries from other industries. All the other figures in the table are our own estimates. We know, for example, the value of yarn sold, and we know that most of it must stay within the textile industry. Each estimate was cross-checked for consistency. We know that in East Germany, as in other economies, there are some particularly large inter-industry flows—from mining into electricity, chemicals and transport; from metallurgy into metal working; from chemicals into agriculture and transport; from agriculture into food, drink and tobacco; from transport into mining, chemicals, building materials; and so on. We also know, however, that East Germany has a sophisticated economy in which there are also other inter-industry flows. To estimate these we have had tc fall back on the input-output ratios calculated by Dr. G. Zeitel.[1]

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[1] Gerhard Zeitel, *Die Steuerlast Verteilung in der Bundesrepublik Deutschland*, J. C. B. Mohr (Paul Siebeck) Tübingen, 1959. Dr. Zeitel expressly refers to his calculations as 'estimates', but this is true of all such calculations, and his book seems to be the best available source.

Fortunately, the same reasoning which enabled us to justify our valuation of East German G.N.P. at West German prices applies here too to a considerable extent. The East German economy is known to be less efficient than the West German economy. But the technical structures of the industries are likely to be much more similar than their economic efficiencies, particularly as East German experts are constantly visiting West Germany, and vice versa. The particular characteristics of the East German economy—the great reliance on lignits as a fuel, as base for electricity generation and as a chemical raw material; the shortage of metallurgical inputs; the relatively greater reliance on railroads for transport—are all taken into account directly. Thus the assumption that the two economies are similar is made only where it is likely to be close to the facts. Moreover, in many cases where the precise intermediary flows were unknown the inputs required are negligible. In the table all zeros except the diagonal and the transport input into construction are to be interpreted as 'negligible '.[1]

The Final Uses. In talking about the final uses, and the total avilability of output, the first point to be made is that we are dealing with an open economy. In our book we stated that we placed greater reliance on our estimates of G.N.P. by industry of origin than on our estimates by use, and made no separate estimates for exports and imports. It remains true that the estimates of final expenditure on the G.N.P. are less reliable than the estimates of G.N.P. by origin. In the input-output table we have taken from *The Structure* the estimates of total gross fixed capital formation and total personal consumption, and estimated their distribution over the various branches of activity. We have also estimated completely independently both imports and exports. Government consumption, including changes in inventories, was obtained as a residual determined by the condition that each column and corresponding row must add up to the same total. The fact that the G.N.P calculated in *The Structure* can be reconciled within the framework of the input-output calculation allows us to place considerable confidence in both.

To obtain the value of imports we relied on some calculations in an unpublished paper by Dr. H. Köhler, who valued the physical quantities shown in official East German statistics at the prices used in estimating the G.N.P. In the case of exports we used his results for mining, metallurgy and agriculture, but made our own calculations for the important metal-working industries—engineering, electrical equipment and supplies, and fine mechanics and optics—and for the chemical industry. The reason for this apparent inconsistency is that whereas the East German trade statistics are comprehensive for imports they are less complete for the exports of the traditional export industries of East Germany. We estimated exports by applying the percentages of the output of major commodities that were exported to the total production of the relevant industry or industry group. For the machine-

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[1] It would have been possible to enter into the other cells of the transaction a zero, wherever we did not know the flow. Unfortunately, zero is also a number, and the machine which inverts the matrix does not know that zero is supposed to mean not zero but ' ignorance '. It has seemed better, therefore, to enter values derived from another economy.

TAB

Input-output Table f
Million DM

Sales by industry group (items 1 to 14) / *Purchases by industry group (items 1 to 14)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1 Mining and gas	0	583	174	431	116	60	30	30	286
2 Electricity generation ...	114	0	50	311	16	102	39	110	28
3 Metallurgy	6	30	0	20	31	38	0	5	89
4 Chemical Industry ...	25	18	26	0	24	449	5	461	577
5 Building materials ...	3	9	34	32	0	5	0	32	32
6 Light industry	4	12	7	120	80	0	65	20	96
7 Food and drink	0	0	0	28	0	5	0	0	0
8 Agriculture	45	0	0	0	239	272	1,822	0	0
9 Transport	584	0	72	134	195	50	6	78	0
10 Unallocated	61	76	38	120	33	216	85	259	154
11 Metalworking	61	33	35	32	20	43	24	97	128
12 Electrical equipment and supplies	2	54	3	8	3	11	0	19	32
13 Fine mechanics and optics	0	5	0	2	0	0	0	0	3
14 Construction	1	8	3	16	3	11	0	97	2
Imports	398	5	404	178	79	551	776	567	0
Value added	1,769	677	884	2,625	859	3,550	1,880	4,368	2,078
Sales value	3,073	1,510	1,730	4,057	1,698	5,412	4,732	6,143	3,525
Labour force ('000's)	207	62	83	251	102	1,178	211	1,678	383
Capital/output ratio	4.88	8.77	9.47	2.26	5.29	0.91	1.38	15.81	7.28

[1] The inter-industry flows in lines 1, 2, 4, 8 and 9 were directly estimated; the others wer

tool industry it is, of course, extremely difficult to estimate prices, and we had to rely on the judgment of our colleagues in the University of Michigan's School of Engineering, who were familiar with the German machines and their prices.

The input-output table contains also estimates of the labour force derived from the East German Statistical Yearbook but adjusted to take account of artisan producers. In *The Structure* we made an estimate of the number of artisans in 1955, and we assumed that the distribution calculated for 1955 held also in 1956.

The capital-output ratio. The treatment of the capital items and the derivation of the capital-output ratios for individual branches of activity require somewhat more discussion.

If one is interested in one year only, the stock of capital and its structure are given and can be forgotten about. On the other hand, in the long run investment is just like any other input, so that the capital going to various industries could be included in a transaction matrix. Dynamic problems can obviously be handled properly only by having a second investment matrix.

Unfortunately we do not have such a matrix, and our practice represents the best compromise we could devise. We include in the transaction matrix only those parts of the outputs of capital goods industries which can be considered current inputs into other industries. That part of capital goods production which is gross investment is outside the transaction matrix and treated as final expenditure.

st Germany, 1956[1]
1950 West German Prices

10	*11*	*12*	*13*	*14*	*Sum of Columns 1–14*	*Personal consumption*	*Government consumption*	*Capital formation*	*Exports*	*Total*
100	46	12	4	15	1,887	576	315	0	295	3,073
116	45	17	6	15	969	361	169	0	11	1,510
0	1,151	235	81	40	1,726	0	0	0	4	1,730
547	102	208	70	40	2,552	487	336	0	682	4,057
450	7	4	0	1,057	1,665	0	0	0	33	1,698
500	120	200	60	23	1,307	2,992	346	116	651	5,412
0	3	0	0	0	85	3,803	801	0	43	4,732
150	0	0	0	65	2,593	2,646	1,000	—-511	55	6,143
311	140	14	2	0	1,586	1,223	716	0	0	3,525
0	380	209	31	45	1,707	5,881	3,130	0	0	10,718
10	0	43	14	65	605	347	0	3,937	2,040	6.929
0	280	0	5	23	440	245	0	926	538	2,149
10	25	17	0	0	62	239	17	326	265	909
5	35	4	0	0	205	0	0	3,031	0	3,236
374	30	0	0	0	3,362					
,145	4,565	1,186	636	1,848	35,070					
,718	6,929	2,149	909	3,236		18,800	6,730	8,185	4,617	35,070
,261	824	225	114	485	8,064					
1.74	1.96	2.78	5.40	0.10						

sed on West German relationships.

On the other hand, as we wish to estimate the capital and labour content of exports and imports, or as we might wish to analyse the effect of alternative investment patterns, it is preferable to leave the investment requirements outside the transaction matrix. We realise that thereby we also eliminate a restraint on the system. All we can say is what capital requirements are or would be. We cannot say how or even whether they could be met. For this reason it must be explicitly stated that our table is only a first approximation. The problem of building capital production restraints into the system must be postponed to a later occasion.

The capital-output ratios shown in the table were calculated as follows. We found first the pattern of investment. We then summed total investment for the period 1950 to 1957, and divided this by the change in G.N.P. in the corresponding branch of activity from 1950 to 1957. Thus the ratios are really average marginal capital-output ratios. It is reasoned that for most industries the total stock of capital cannot be too different from the sum of the investments in the eight years, and that therefore this procedure gives an acceptable approximation to the ratio of capital stock to production. The only exception was the estimation of the value of the capital stock in construction which was derived directly from published data of major mahinery owned by the construction industry. The capital-output ratio of 0.1 is very low, but no lower than in Norway.[1]

[1] See Leif Johansen, *A Multi-Sectoral Study of Economic Growth*, North Holland Publishing Company, Amsterdam, 1960. Calculated from data on Table 4 facing p. 66, and Table 5.3; p. 77.

TABLE II

Sources of Investible Funds
(Millions East DM, at current prices)

	State	State enterprises	Private or cooperative investment	Total gross fixed investment
1950	2,009	207	394	2,610
1951	2,608	358	834	3,800
1952	3,240	443	1,017	4,700
1953	4,288	404	908	5,600
1954	3,773	316	789	4,878
1955	4,728	1,190	882	6,800
1956	6,370	1,877	1,102	9,349
1957	7,445	1,205	1,850	10,500

TABLE III

Uses of Funds for Gross fixed Investment by Sectors
(Million East DM. at current prices)

	Industry[1] (1)	Agriculture[2] (2)	Residential[2] Construction (3)	Transport and Communications[1] (4)	Trade (5)	Unaccounted for (6)	Total (7)
1950 ...	1,064	412	286	224	19	605	2,610
1951 ...	1,463	505	469	373	63	927	3,800
1952 ...	2,004	700	511	390	53	1,042	4,700
1953 ...	2,381	1,027	6771	458	66	896	5,600
1954 ...	2,077	886	856	458	65	536	4,878
1955 ...	2,189	1,032	977	800	139	1,663	6,800
1956 ...	3,245	1,199	1,199	1,173	130[3]	2,483	9,349
1957 ...	4,277	1,034	1,636	1,240	130[3]	2,183	10,500

[1] State investment only.
[2] State and private investment.
[3] No information available; assumed to be at about the 1955 level.

The first step in finding the distribution of investment was to assemble all the published figures, in East German marks, of investment by branch of activity. Most of the detailed information relates to state investment. For years since 1956, however, total investment—state, co-operative, and private—is officially given for each major branch of activity, and so is the total value of house building. We know that most private investment is in agriculture and residential construction, and—possibly to a small extent—in trade. It is safe to assume that very little private investment found its way into industry. Tables II and III give the sources and uses of investment funds in current East marks. Table III shows sizeable differences between the total investment claimed to have occurred and the investment we could account for separately. We assume, not unreasonably, that this represents additions to stocks, which we know to have been substantial, some defence expenditure, and expenditure on investment for collective purposes, such as schools and hospitals, cultural centres, parks of culture and rest—not to mention party buildings.

In distributing the investments over the 14 sectors used in the table, a variety of methods was used. For some sectors we have direct information;

TABLE IV

Percentage Distribution of Gross Fixed Investment at current East German prices

	1950	1951	1952	1953	1954	1955	1956	1957
Industry								
Mining	3.7	3.9	7.0	6.3	7.1	5.8	8.0	10.2
Electricity production	3.7	6.0	5.1	6.6	9.2	10.5	4.2	2.9
Metallurgy	9.1	10.0	9.5	12.0	11.3	8.9	11.3	9.0
Chemical industry	5.5	5.6	6.9	7.4	7.1	4.7	6.2	7.5
Machine building	21.8	18.0	18.0	12.6	9.2	7.7	9.6	15.1
Electrotechnical industry	5.3	5.3	5.2	5.7	5.4	5.2	6.4	6.5
Fine mechanics and optics	3.0	2.9	2.8	2.8	2.7	2.6	2.3	2.7
Building materials	2.9	2.9	2.8	2.4	2.2	2.5	3.5	3.7
Light industry	3.5	3.2	3.5	2.8	2.6	2.5	2.9	3.2
Food, drink and tobacco	3.3	3.0	2.9	2.6	2.6	2.3	3.0	3.2
Total	62.0	60.8	63.7	60.6	59.6	52.6	57.4	64.0
Agriculture	23.9	21.0	22.2	26.4	25.4	24.8	19.8	15.4
Transport and communications	13.1	15.5	12.4	11.6	13.1	19.3	20.7	18.6
Trade	1.1	2.6	1.6	1.7	1.9	3.3	2.3	2.0

for others we used indicators which could be used to expand direct information for a particular year. (For example, changes in installed electric generating capacity were so used. In some cases changes in the labour force were used in this manner.) For the crucial machine-building sector we relied on figures of the output of individual machine tools *less* known exports (including, in the early years, exports for reparations).

Though not much is known about reparations payments, there is reasonable indication that substantial percentages of the output of some industries were delivered.[1]

Next the calculated components were added and a percentage distribution. derived. For the years from 1951 to 1955 inclusive, the addition is close to the overall figure of investment in industry. For 1950 and 1956 and 1957 there are unexplained divergencies which may be due in part to classification changes.

The next step was to derive a percentage distribution of total investment among branches of activity, after eliminating residential construction, for which we had an independent estimate. Finally, this percentage distribution was applied to the value of gross fixed investment *less* residential construction as given in *The Structure*, on the implicit assumption that there was no systematic price distortion within any given year as between the various branches. The data are presented in Tables IV and V.

All of the capital-output coefficients calculated in this way turn out to be reasonable, except that for agriculture which is astonishingly high. It is probable that in our calculations we over-estimated investment, through overstating the share of private investment that went into agriculture. It is possible, too, that the East Germans overstated investment in agriculture. But there are three reasons for expecting a high capital-output ratio in East

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[1] For reparations deliveries we relied primarily on Franz Rupp, *Die Reparationsleistung der sowjetischen Besatzungszone in den Jahren 1945 bis Ende 1953*, Bonn 1953; anonymous, ' Die sowjetischen Entnahmen aus dem Produktionsaufkommen der SBZ, 1951 ', Materialien, Bonn, n.d., also ' Der Schwermaschinenbau in der SBZ ', Bonn, n.d.

TABLE V

Investment, increase in product and capital-output ratios, East Germany 1950–57
(1950 West German prices)
Million DM at

	1950	*1951*	*1952*	*1953*	*1954*	*1955*	*1956*	*1957*	*Total 1950–7*	*Increase in product 1950 to 1957*	*Capital/ output ratio*
Industry											
Mining and gas	105	139	271	305	372	363	619	880	3,054	626	4.9
Electricity generation	105	214	197	320	463	658	325	270	2,552	291	8.8
Metallurgy	258	357	368	582	592	558	874	777	4,365	461	9.5
Chemicals	156	200	367	359	372	294	480	643	2,775	1,229	2.3
Metal-working	618	642	697	610	462	463	732	1,303	5,577	2,845	2.0
Electrical equipment	150	189	202	276	283	326	495	561	2,482	893	2.8
Fine mechanics and optics	85	103	108	135	141	163	178	233	1,146	212	5.4
Building materials	72	103	108	117	115	156	270	319	1,270	240	5.3
Light industries	100	114	135	135	136	156	225	276	1,277	1,404	0.9
Food, drink and tobacco	93	107	112	126	136	144	232	276	1,226	891	1.4
Total	1,759	2,166	2,467	2,936	3,122	3,296	4,439	5,523	25,708	9,213	2.8
Agriculture	678	748	860	1,265	1,330	1,554	1,531	1,329	9,295	588	15.8
Transport and communications	272	552	430	562	686	1,209	1,601	1,805	7,067	971	7.3
Trade	31	93	62	82	99	207	178	173	925	1,246	0.7
Total	2,837	3,563	3,872	4,845	5,238	6,166	7,824	8,629	...	...	...

German agriculture. First, there is no doubt that agriculture is inefficient. Second, the changes in output between any two years, being subject to weather hazards, are bound to be erratic. Third, in agriculture the substitution of capital for labour has probably gone further than in other industries. In any case, in East, Germany, as in West Germany and elsewhere, the labour force in agriculture has declined substantially since 1950.

RESULTS[1]

Our calculations suggest the following conclusions, all of which, of course, hold only to the extent that it is reasonable to use West German prices of 1950 and that our estimates of the inter-industry flows are not too far out.

(i) In both 1956 and 1959, it seems, East Germany had a substantial export surplus in terms of 1950 prices but the surplus diminished between these two years. We are not certain whether the balance of payments on current account at current East German prices showed an export surplus, nor how the surplus was financed. East German sources state that there was an export surplus on merchandise account at current prices in both years. As our calculations give export and import volumes, weighted by 1950 West German prices, it is possible to hazard a guess on how the terms of trade of East Germany have changed between 1956 and 1959 (see Table VI).

From our estimates it appears that the terms of trade of East Germany improved by more than one-quarter from 1956 to 1959. This result does not, of course, contradict in any way the findings of Horst Hendershausen that the terms of trade granted by the Soviet Union to its satellites were worse than the terms of trade that could have been obtained from Western countries.[2] All we can infer is that, if there was exploitation through unfavourable terms of trade in 1956, it has substantially diminished since then.[3]

Our figures suggest that the resources given up as an export surplus were about halved, in real terms, from 1956 to 1959.[4]

We find that with the increase in the volume of imports and exports, there went a change in their composition. Imports of mining products, of food, drink and tobacco, and of those agricultural imports presumed to go

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[1] All our results from the 'solution', or transpose, of the transaction matrix in Table I (not reproduced here) and from the labour and import coefficients and capital-output ratios shown in Table I.

[2] H. Mendershausen, 'Terms of Trade between the Soviet Union and the Smaller Communist Countries, 1945–1957' *Review of Economics and Statistics*, Vol. XLI, No. 2, May 1959.

[3] Mr. Jan Wszelaki, 'Soviet Price Discrimination in Export to East Central Europe', Assembly of Captive Nations, Document 207 (VI) Econ., June 7, 1960, concludes that while East Germany paid higher prices for imports from the Soviet Union than from Western countries for comparable imports, it paid less than other satellites. No conclusion on the terms of trade is, of course, possible without consideration of export prices, but it can be concluded that in imports East Germany was favoured by Russia.

[4] All statements are always subject to the proviso that the weighting system implied in the use of West German prices is acceptable. In *The Structure* reasons are given why it should be sensible. Different weighting systems will, of course, give different results, and possibly even reverse the results found. But we think it unlikely that any reasonable weighting system would change the export surplus into an import surplus.

TABLE VI

East German Foreign Trade

	Values (Million rubles) 1956	*Values (Million rubles)* 1959	*Indices of trade in 1959 (1956=100)* Value	*Indices of trade in 1959 (1956=100)* Volume[1]	Price (derived)
Exports	5,629	8,466	150	125	123
Imports	5,334	7,970	149	153	97

[1] At 1950 West German prices.

directly into trade and final consumption and hence included in the 'unallocated' sector, diminished relatively, while all others increased in relative importance (see Table VII). On the export side, the exports of the light industries and of food, drink and tobacco sharply increased in relative importance; those of mining products (mainly potash), chemicals engineering products, and precision instruments, more or less maintained their relative importance, and the other industries declined relatively. The exports of some industries—electricity, building materials, and even electrical equipment—even decreased absolutely. On the whole the change seems to have been in the direction of the pre-war structure of foreign trade.

We may mention in passing that the improvement of the terms of trade and the reduction of the (real) export surplus were accompanied by an increase in the investment ratio and an improved performance by the economy. A full discussion of this point would, however, require a separate paper.

(ii) In this import and export structure sensible? Professor Leontief in his celebrated studies calculated the capital/labour ratios of exports and import substitutes in the American economy, and we can do the same thing for East Germany. But we can go farther than stating that East German exports are relatively labour- or capital-intensive, as the case may be. We can enquire into the gains from trade.[1] Trade benefits a country if the same output can be obtained for less inputs; this is achieved by reallocating resources from the less to the more efficient branches of production and changing the composition of output. We ask therefore: what is the amount of capital and labour required to produce DM. 1 million of exports distributed in the proportion of the actual 1956 exports? How much capital and labour would be required to produce DM. 1 million domestic substitutes for competitive imports? Our input-output table permits us to attempt rough answers to these questions.

In 1956, our very risky calculations suggest, DM. 1 million of exports required DM. 5.2 million of capital and 172 man-years of labour (and also DM. 77,000 of imports of various descriptions). To produce DM. 1 million of import-substitutes—excluding, of course, all the imports that could not be produced in East Germany at all, such as coffee or cotton, or that could not

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[1] See e.g. Paul A. Samuelson, 'The Gains from International Trade', reprinted in H. S. Ellis and L. A. Metzler, eds., *Readings in the Theory of International Trade*, Philadelphia, 1949.

Table VII

Distribution of imports by industry of use
Million DM. at 1950 West German prices and percentages

	Imports						*Exports*	
	1956			*1959*			*1956*	*1959*
	Total imports	*Competitive imports*[1]	*Percentage distribution of competitive imports*	*Total imports*	*Competitive imports*[1]	*Percentage distribution of competitive imports*	*Percentage distribution*	
Mining and gas	398	111	5	497	131	3	6	6+
Electricity	5	5	—	9	9	—	—	—
Metallurgy	404	404	17	753	753	20	—	—
Chemicals	178	175	7	300	294	8	15	14
Building materials	79	28	1	162	31	1	1	—
Light industry	551	268	11	896	577	15	14	21—
Food, drink and tobacco ...	776	776	32	1,183	1,183	30	1	4
Agriculture	567	248	10	883	367	10	1	1—
Transportation	—	—	—	—	—	—	—	—
Unallocated	374	374	16	368	368	10	—	—
Metalworking	30	30	1	108	108	3	44	43
Electrical equipment and supplies	—	—	—	—	—	—	12	6
Fine mechanics and optics ...	—	—	—	—	—	—	6	5
Construction	—	—	—	—	—	—	—	—
	3,362	2,419	100	5,159	3,821	100	100	100

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[1] Those imports regarded as non-competitive commodities are: soft coal, soft coal coke and iron ore (routed through mining and gas), organic dyes (routed through chemicals), certain kinds of cut timber (building materials), cotton, jute and soft leather (light industry) and rice, oilseeds, nuts, grapes, citrus fruits, green, coffee beans, cocoa beans and powder, tea, skins and hides, and some uncut timber (all routed through agriculture).

be produced in sufficiently increased quantities, such as soft coal—would have required DM. 9.3 million of capital, and 219 man-years of labour.[1] There was clearly a gain from trade, though whether or not its composition was optimal we cannot of course say (see Table VIII).

This result depends to an uncomfortably large extent on the huge capital requirements of agriculture, which as we have suggested earlier, are probably over-estimated. But even if the capital requirements of agriculture were reduced by a half, one million of import substitution would, it seems, still have needed DM. 6.4 million capital, and even with a capital-output ratio in agriculture reduced still further to 5, the figure does not go below DM. 5.4 million, that is, slightly more than the DM. 5.2 million required to produce the exports.

Clearly, therefore, international trade has been beneficial to East Germany, in the sense that to produce imports indirectly *via* exports requires both less capital and less labour than to produce the goods directly. The extent to which the result is influenced by the large capital-output ratio of agriculture brings out yet another point. It is known that agriculture is inefficient in communist economies, and East Germany is no exception. If this inefficiency is taken as a datum about which little can be done, then it is clearly sensible for East Germany to shift this inefficiency to others through imports of agricultural products. If, however, agricultural efficiency could be improved substantially, a radical change in the export and import bill might be required.

The capital requirements per man-year of labour for exports in 1956 were of the order of DM. 28–30,000. East German exports are thus relatively-capital-intensive. As about three-quarters of East German trade is with the communist bloc, and as East Germany is probably industrially the most advanced nation in the bloc, the result is at least not unreasonable.

(iii) Similar calculations for 1959[2] suggest that as a result of changes in the composition of exports between 1956 and 1959, DM. 1 million of exports in 1959 required capital of almost DM. 5 million, 175 man-years of labour and about DM. 100,000 of imports. That is, the 1959 exports needed fractionally less capital (even assuming no structural changes in the economy) and fractionally more labour and imports than the goods exported in 1956. Import substitutes, however, had become cheaper in terms of capital and also in terms of labour.

Once again, it seems that even if the capital requirements of agriculture are adjusted downwards, import replacements would have required more capital and more labour than the exports actually made. Further, there is

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[1] For 1956 we have also calculated the capital and labour requirements for all imports, but the figures are less interesting and meaningful and are therefore not reproduced. One could, in principle, use the method, however, to measure the cost of autarky. For example, synthetic fibres could be substituted for cotton or jute imports. To do this, a different bill of final goods would have to be estimated, and an estimate would have to be made of how much perlon, etc. is equivalent to how much cotton.

[2] It should be stressed that, as we used the same 1956 input-output table for the calculation, we have of course assumed that structural relationships within the economy remained unchanged.

TABLE VIII

Capital and labour requirements of East German export and import substitutes, 1956 and 1959
(Thousand DM and man-hours per million DM of output valued at 1950 West German prices)

	1956				1959			
	Exports		*Import substitutes*		*Exports*		*Import substitutes*	
	Capital	*Labour*	*Capital*	*Labour*	*Capital*	*Labour*	*Capital*	*Labour*
Mining and gas	593	8	497	7	577	8	458	6
Electricity	309	1	364	2	296	1	299	1
Metallurgy	969	5	1,673	8	890	5	1,986	10
Chemicals	462	13	282	8	438	12	291	8
Building materials	90	1	210	2	31	1	121	1
Light industries	161	38	121	29	212	50	156	37
Food, drink and tobacco ...	18	1	447	14	60	2	431	14
Agriculture	490	8	5,767	97	587	10	3,659	63
Transport	366	5	327	5	351	5	315	5
Unallocated	117	14	334	40	107	13	236	29
Metalworking	893	54	56	3	872	52	88	5
Electrical supplies	385	14	12	5	231	8	15	1
Fine mechanics and optics ...	326	8	3	—	292	7	3	—
Construction	1	1	1	1	1	1	1	1
Total	5,180	171	9,325	219	4,975	175	8,059	181

evidence that capital was used more effectively in 1959 than in 1956 in the production of both exports and import substitutes. Capital per man-year in exports had been reduced to DM. 28,000—a figure less than what was needed for import substitutes, whatever is assumed about agriculture's capital requirements. There seems little doubt that in 1959 exports were relatively labour-intensive, as compared with import substitutes. The interpretation of this fact is at least in part that the East Germans have succeeded in substituting their highly skilled labour for material-intensive imports and inputs. As it was a stated aim of the planners to reduce material inputs, we conclude that the effectiveness of planning had also somewhat increased.

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NOTES ON BALANCE OF PAYMENTS ESTIMATES

By ARTHUR HAZLEWOOD

These notes provide more details on matters summarily examined in the chapter on ' The Export and Import of Capital ' in the forthcoming new edition of *The British Economy*.[1]

Before the publication of revised estimates of the United Kingdom balance of payments in March, 1961,[2] it was recognised that in the official estimates ' a major weakness is the limited coverage of reinvested profits '.[3] This limited coverage affected both the current and the capital account. In the current account, ' interest, profits and dividends: in general includes investment income actually remitted from or to the United Kingdom . . . and *where possible* profits retained for reinvestment '.[4] In the capital account, the item ' other long-term capital (net) ' comprises ' all other long-term investment and disinvestment by the United Kingdom in the rest of the world and long-term investment and disinvestment by the rest of the world in the United Kingdom, including *where possible* reinvestment of retained profits, on which, however, *information is seriously incomplete* '.[4] In principle, the retained profits of the overseas subsidiaries of United Kingdom companies enter as a receipt, and those of the United Kingdom subsidiaries of foreign companies as a payment in the current account. In practice, until the publication of the revised estimates for 1958 and subsequent years, a large part of these retained profits appeared nowhere in the accounts.

The statements of the official statisticians imply a limited coverage of reinvested profits on both sides of the balance of payments. It is impossible to detect in these statements any opinion on whether the coverage of United Kingdom retentions abroad was more or less complete than that of foreign retentions in the United Kingdom. Unofficial writings on the balance of payments have not, however, adopted so neutral a position. Attention has been centred on U.K. retentions overseas.

The useful publication of Political and Economic Planning on *Growth in the British Economy*, blithely ignoring the clear warning of the official documents, rightly as it turned out,[5] remarks that the fact that the balance of payments ' includes as a capital export the profits retained overseas by subsidiaries of British companies is not always realised '.[6] The discussion of the matter by P.E.P. is taken, however, from a secondary source: two articles in *The Times* newspaper by John Wood and T. M. Rybczynski.[7]

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[1] *The British Economy, 1950–1960*, edited by Worswick and Ady.

[2] *United Kingdom Balance of Payments, 1958 to 1960*, Cmnd. 1329.

[3] *United Kingdom Balance of Payments, 1946 to 1957*, 1959, p. 7.

[4] *United Kingdom Balance of Payments, 1957 to 1960*, Cmnd. 1188, October 1960, pp. 25–6. Italics added.

[5] See below.

[6] *Growth in the British Economy: A study of economic problems and policies in contemporary Britain*, P.E.P., 1960, p. 174.

[7] ' Should Britain Restrict Investment Abroad? ', *The Times*, 24 and 25 April, 1958.

The authors of these articles estimated that, in 1957, United Kingdom investment abroad through the retention of profits amounted to rather more than £200 million. Reinvestment of profits in the United Kingdom by foreign companies was put at less than £50 million. Although this estimate is given of retentions in the United Kingdom, little or nothing is said about them in the articles; the focus of interest is on United Kingdom retentions overseas.

It is an oddity of the articles by Messrs. Wood and Rybczynski that, while reference is made to the official statement that information on retained profits is seriously incomplete, it is accepted that the balance of payments figures for net overseas investment are substantially correct. Estimates are given for various categories of United Kingdom investment overseas and of overseas investment in the United Kingdom which add up to the figure for net overseas investment published in the balance of payments White Paper. The authors presumably believed that, despite the serious lack of information, the official statisticians were able to hit upon the right figure for the balance of net overseas investment.

The Wood-Rybczynski estimate of United Kingdom investment overseas through the retention of profits achieved some prominence. Although there is no acknowledgement of the source, it must be to their estimate that the Radcliffe Committee refer when they remark that ' it has been estimated that reinvestment by United Kingdom firms out of overseas earnings is of the order of £200 million a year, and this is not far short of the rate of net overseas investment in recent years.'[1]

It is impossible to determine from their *Report* whether or not the Radcliffe Committee also believed the official balance of payments estimate of net overseas investment to be substantially correct. Was the point of the remark quoted above merely to emphasize the scale of reinvestment? Or was some implication intended about the true rate of net overseas investment? Certainly, it is emphasized in the Radcliffe documents how imperfect are the figures of overseas investment.[2] A table of figures provided by the Bank of England of United Kingdom gross external investment is accompanied by a note which points out that ' investment from retained profits is only partly covered, and the resulting figures are known to be seriously incomplete '.[3] The Radcliffe Committee, therefore, clearly thought that the estimates understated United Kingdom gross investment overseas. These Bank of England figures of United Kingdom gross investment, when put together with their less detailed figures of foreign investment in the United Kingdom,[4] appear consistent with the balance of payments figures for net investment. But as there is no discussion of the adequacy of the figures of capital inflow, nothing can be deduced about the Committee's view of the official net investment estimates.

That there was an understatement of net investment is certainly the view of Mr. A. R. Conan, who expresses it with much force in his study of *Capital Imports into Sterling Countries*.[1] Mr. Conan refers to the Wood-Rybczynski estimate which puts ' investment abroad by retentions at an average of £200 million per annum in recent years ' and argues that ' the omission of the greater part of this credit would imply that for 1956–57, for example, the true surplus (in the current account of the balance of payments) may have been of the order of £400 million per annum as against the published figure of about £250 million.'[2]

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[1] *Report*, para. 735.

[2] See *Report*, paras. 736 and 845; *Minutes of Evidence*, question 865 and Appendix, p. 951.

[3] *Report*, p. 264.

[4] See *Minutes of Evidence*, Appendix, p. 952.

It is, however, difficult to reconcile the evidence[3] with this view of the extent to which the official figures for the years in question understate the magnitude of United Kingdom investment overseas. The evidence is inconsistent with the view that the understatement is anything like as big as Mr. Conan suggests.

Mr. Conan's discussion is unsatisfactory, in the first place, because he refers only to retentions by United Kingdom companies overseas, and makes no reference to retentions by foreign companies in the United Kingdom. His addition of about £150 million to the current account surplus could be taken to imply the belief that some £50 million of reinvested profits are included in the official estimates. If this is his belief, the addition of £150 million would be a valid procedure only if all reinvestment by foreign companies in the United Kingdom were already included in the official accounts.[4] There has, however, at no time been reason to think that they are all included.[5] The addition of £150 million is, therefore, correct only if substantially less than £50 million of profits retained abroad by United Kingdom companies are included in the official estimates. Consideration of official statements about the position of the oil industry makes it difficult to believe that so small an amount is included in the balance of payments accounts.

The investments of the oil industry are known to be an important part of total United Kingdom private investment overseas. The Bank of England informed the Radcliffe Committee that ' of the industries which have invested in the sterling area, oil has had the largest share even when allowance is made for the fact that certain major enterprises conduct their overseas business from the U.K. but are partly foreign owned', and outside the sterling area, 'the oil industry has again been the leading private investor'.[1] But the oil companies 'provide comprehensive returns of their investment, less depreciation, in all parts of the world.'[2] An important part of the companies' investment must be financed from retained profits, so that a figure of less than £50 million is far too small to allow for the reinvestments of the oil industry and for such other reinvestments as are included in the balance of payments accounts. This conclusion is supported by the new official statistics of overseas direct investment.

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[1] Macmillan & Co. Ltd., 1960.

[2] *Op. cit.*, p. 84.

[3] This is true, it is argued below, not only of the evidence available since the re-casting of the balance of payments accounts in Cmnd. 1329, published in March, 1961. It is even true of the evidence available before the publication, in October 1960, of the first results of the Board of Trade inquiry into direct investment overseas.

[4] It is impossible to tell from Mr. Conan's discussion whether he is simply in error in ignoring retentions by foreign companies in the United Kingdom, or whether his argument is elliptical and that such retentions are taken into account in his computations, even though he makes no reference to them. In any case, it is curious that he feels able to use the Wood-Rybczynski estimates, which add up to the official net investment figure, to argue that the official net investment figure is far too small.

[5] See the quotations from Cmnd. 1188, which appear also in earlier editions of the White Paper. Note also: ' So far as possible, debits include the earnings of foreign-controlled companies in the United Kingdom which are not distributed as dividends but retained and added to capital; it seems unlikely however that they are known at all completely, whether from exchange control procedures, the examination of balance sheets or other sources.' (*United Kingdom Balance of Payments, 1946–1957*, p. 9.)

By the time the Radcliffe Committee published their *Report*, the Government had announced its intention 'to collect figures relating to interest, profits, dividends, and capital transactions connected with overseas investment'.[3] The first results of the new Board of Trade inquiry into 'United Kingdom private direct investment overseas and the corresponding overseas private direct investment in the United Kingdom' were published towards the end of 1960.[4] The data relate to all direct investment other than that by oil companies and insurance companies. For 1958, the first year covered by the inquiry, investment by the United Kingdom through the unremitted profits of overseas subsidiaries is put at £74 million.

The figure of £74 million certainly falls a long way short of the unofficial estimate of £200 million a year, but the Board of Trade figures exclude investment by oil companies and insurance companies. The difference of £126 million between the Board of Trade figure and the unofficial estimate of £200 million may, perhaps, indicate the magnitude of reinvestment in the sector not covered by the Board of Trade inquiry. If it does so, however, and if the reinvestments of the oil industry are fully included in the 'comprehensive returns' made by the companies, it cannot also be maintained that the balance of payments accounts include profits retained overseas only to the extent of less than £50 million, and that a further £150 million must be added to arrive at the true figure.

If the results of the Board of Trade inquiry represent anything like a true picture of the situation,[5] it is apparent that the view expressed by Mr. Conan greatly exaggerates both the understatement in the official accounts of the United Kingdom reinvestment overseas and the true level of net foreign investment by the United Kingdom.

This conclusion appears to be confirmed by the new estimates of the balance of payments for 1958 and subsequent years which were published in March, 1961.[6] Indeed, the new estimates go further. They show that the official statisticians now believe that there was, in fact, virtually no understatement of United Kingdom investment abroad in the old estimates, but that there was a serious understatement of reinvestment by foreign companies in the United Kingdom so that, in consequence, the old estimates of United Kingdom net investment abroad were substantially too large. In the revised accounts ' the figures of overseas private capital investment in the United Kingdom are increased through the inclusion of more re-invested profits ', but the ' figures for private investment abroad by the United Kingdom are virtually unchanged at about £300 million a year.'[1]

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[1] Radcliffe Committee *Minutes of Evidence*, Appendix p. 952.

[2] *United Kingdom Balance of Payments, 1946–1957*, p. 11.

[3] Radcliffe Committee *Report*, para. 844. See also announcement by Chancellor of the Exchequer, 28th April, 1959.

[4] *Board of Trade Journal*, 7th October, 1960, pp. 803–5. Data for 1958–60 are published in the *Board of Trade Journal*, 6th October, 1961, pp. 715–20. More detail is given in this article than in the earlier article in which the results of the inquiry were first reported.

[5] And if it is broadly true of 1956–57 as well as of 1958.

[6] Cmnd. 1329. The revisions to the estimates are discussed in some detail in *Economic Trends*, March 1961.

There are two reasons for the increased estimate of profits reinvested in the United Kingdom. The first is that the Board of Trade inquiries into industries other than oil and insurance ' have shown that retained profits on overseas investment in the United Kingdom are higher than had previously been allowed for.'[2] The second is that oil company profits retained for reinvestment in this country, ' concerning which information is now available for the first time '[3], have been included in the accounts.

The new estimates reduce United Kingdom net investment abroad in 1958 by £80 million. The profits reinvested in the United Kingdom by foreign firms, the inclusion of which in the capital account is responsible for this decrease, are also added to the debit side of the ' Interest, profits and dividends ' item in the current account: 'As such profits are included as a debit in the current account, the estimate of the current account surplus . . . has been revised downwards.'[4] Confusingly enough, however, the item in the current account to which this substantial debit has been added is revised from a net credit of £41 million to a net credit of £261 million. The explanation is to be found in the fact that the inclusion of profits which previously appeared nowhere in the accounts is not the only revision of the estimate of this item. In addition, there has been a transfer from the item ' Other services ' to ' Interest, profits and dividends ', and to ' Shipping ', because ' it has . . . become possible to allocate oil transactions previously included in other invisibles (net) to more appropriate parts of the current account.'[4]

Comment on the new estimates of the balance of payments has not been free from misunderstanding. ' Because a Board of Trade inquiry into foreign investments in this country showed that the profits earned and retained by overseas firms here are much larger than had been suspected,' wrote the Financial Editor of *The Guardian*, ' a substantial credit figure has been shifted from current to capital account.'[5] In fact, of course, the revision of the accounts was not a matter of transferring to the capital account transactions previously included in the current account; the new estimates include in both current and capital accounts transactions which previously appeared nowhere in the estimates. In its report of the March, 1961 White Paper, *The Times* states that ' because of the change in the basis of the balance of payments figures—a change made necessary by the gradual abolition of exchange control —the payments accounts include a very large " balancing item " of £377 million '.[1] There appears to be no justification for this statement. Certainly, the balancing item in 1960 on the new basis of the estimates was of the record size of £377 million, but as there are no estimates for the whole of 1960 on the old basis it is difficult to see how the large size of the balancing item in that year can be known to be ' because of the change in the basis of the balance of payments figures '. There are estimates on both bases for 1958 and 1959. For the former year the balancing item on the new basis is £28 million smaller, and for the latter year £22 million bigger than on the old basis. More up-to-date figures for these two years published in October, 1961,[2] show the balancing item to be £61 million smaller in 1958 and £32 million smaller in 1959 on the new basis of the balance of payments estimates than in the latest figures on the old basis, published in Cmnd. 1188.

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[1] *Economic Trends*, March 1961, p. ii. The Wood-Rybczynski estimate of U.K. private investment abroad in 1957 is extremely close to the new White Paper figure for 1958. Their estimate for investment in the U.K., however, is very much smaller than the figure in the White Paper.

[2] *Economic Trends*, March 1961, p. ii.

[3] *Economic Trends*, March 1961, p. v.

[4] Cmnd. 1329, p. 7.

[5] *The Guardian*, 30th March, 1961.

The Radcliffe Committee ' were glad to learn from the Treasury that their calculations are now based on the assumption of a larger current account surplus in the early 1960s.' The Committee reports that ' in assuming that the " desirable " balance of payments surplus should average £450 m. a year, the Treasury allows £150 m. for repaying short-term liabilities and building up reserves, £90 m. for new governmental lending and repayments of loans, and the remainder, a little over £200 m., for net additions to private overseas investments.'[3] The Table below compares this ' aim ' with the results on the old and on the revised basis of estimation. The revisions substantially widen the gap between aim and achievement. But the aim needs to be restated. Although the aim for external investment is expressed in net terms, the concern is properly with the gross flows. It is the gross outflow, unaffected by the revisions in the estimates, which contributes to the ends of policy.[4] The discovery of a previously unknown inflow of capital does not affect the matter. Indeed, it has been argued by the Radcliffe Committee that ' if it is so important that the United Kingdom should remain a major source of capital to the Commonwealth, and if it has itself so much need of capital that it cannot sustain sufficient investment overseas without injury to its own economic development, there is a case for borrowing abroad '.[5] But such borrowing would increase the apparent divergence between aim and achievement unless the aim was restated in a revised form. However, it must be admitted that the divergence between aim and achievement in 1960 is so large that it would not be significantly lessened by such a restatement of the aim.

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[1] *The Times*, 30th March, 1961.

[2] *United Kingdom Balance of Payments, 1958 to 1961*, Cmnd. 1506.

[3] Radcliffe *Report*, para. 734.

[4] As set out, for example, in Radcliffe *Report*, paras. 741–2.

[5] *Report*, para. 747.

Balance of Payments Estimates
£ million

	Government Lending	*Private Investment*	*Monetary Movements*	*Balancing Item*	*Current Balance*
'Aim'	− 90	−210	−150	...	+450
1958 (old basis)	− 49	−210	−213	+127	+345
1959 (old basis)	−121	−200	+140	+ 42	+139
1958 (new basis)	− 49	−137	−200	+ 66	+320
1959 (new basis	−121	−126	+147	+ 10	+ 90
1960 (new basis)	−104	− 92	+171	+364	−339

Note: In the figure for 1959 an amount of £232 million, consisting of the additional U.K. subscription to I.M.F., has been included as a negative item in the total of Monetary Movements and not in Government Lending.

Sources: Radcliffe *Report*, para. 734 and balance of payments White Papers, Cmnd. 1188 and Cmnd. 1506.